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MEDICATION COST AND UTILIZATION IN HOSPICE CARE:
AN ANALYSIS OF 2007 CLAIMS DATA

A Thesis

Submitted to the Mylan School of Pharmacy

Duquesne University

In partial fulfillment of the requirements

for the degree of Master of Science

By

Rachi H. Parekh

May 2013

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Rachi H. Parekh

2013

MEDICATION COST AND UTILIZATION IN HOSPICE CARE:
AN ANALYSIS OF 2007 CLAIMS DATA

By

Rachi H. Parekh

Approved March 20, 2013

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ABSTRACT

MEDICATION COST AND UTILIZATION IN HOSPICE CARE: AN ANALYSIS OF 2007 CLAIMS DATA

By

Rachi H. Parekh

May 2013

Thesis Supervised by Dr. Khalid M. Kamal

Objectives:

1. Describe patient-related and hospice-related characteristics such as gender, average length of hospice stay, primary diagnoses, average daily census, number of admissions per year, net operating revenues, inpatient unit (IPU) operating costs, and medication expenditures of hospices in Ohio and compare it with NHPCO data.
2. Identify and analyze therapeutic drug classes and medications with the most frequent utilization rates and largest percentage of expenditures in hospice care.

Method:

Hospice Pharmacy Benefit Managers (PBM) employ pharmacists to provide comprehensive pharmaceutical care services for patients under hospice care and one component of pharmacist provided services include comprehensive medication review. To study the impact of pharmacist-led medication review on hospice costs and medication utilization, PBM claims data for year 2007 were obtained from five hospices in Ohio. The data included information on utilization and costs of medications, patient-related (gender, average length of hospice service, and primary diagnoses) and hospice-related (number of admissions per year, average daily census, net operating revenues, inpatient unit [IPU] operating costs and pharmacy costs) characteristics. Claims data were analyzed to identify the most frequently used therapeutic drug classes and those classes which contributed to the largest percentage of pharmacy expenditures. Prescription drug count and total cost for medications under the identified therapeutic drug classes were also obtained. For benchmarking purposes, analysis was conducted to compare patient and hospice-related data obtained from the five hospices to the 2007 NHPCO data.

Results:

The average number of admissions per hospice for the year 2007 was 627 patients. Average daily census (136 patients) and total patient days (51,350 days) in these five hospices were 1.5 times higher as compared to that of NHPCO data (90 patients and 31,300 days, respectively). Annual drug expenditures per hospice ranged from \$67,580 to \$763,413 while average hospice medication cost per patient per day (PPPD) was \$11.12 (\$12.43 PPPD for home care and \$8.5 PPPD for nursing care). Average PPPD

excluding outliers such as enoxaparin was \$10.72 (\$12.05 PPPD for home care and \$8.25 PPPD for nursing care).

Approximately 1,020 different drugs under 246 therapeutic classes were utilized in the five hospices. The most frequently utilized therapeutic class of drugs, based on prescription drug volume included analgesic-narcotics (15.6%) followed by laxatives-cathartics (7.5%), and anti-anxiety drugs (7%). Therapeutic classes contributing to the majority of drug expenditures, included analgesics-narcotics (16.5%), SSRIs (4.7%), and anti-anxiety drugs (4.5%). Medications whose frequency of use accounted for high expense included morphine sulfate (5.3% - utilization, 4.4% - expenditure), lorazepam (4.4%, 3.1%), furosemide (4%, 0.6%), methadone (3%, 0.9%), and prednisone (3.1%, 0.5%). Medications such as enoxaparin injections whose frequency of utilization was low (0.01%), contributed to 3.1% of total medication expenditure. Likewise, fentanyl and oxycodone contributed to 3.5% and 3.7%, respectively to the total medication expenditure, but their frequency of utilization was only 0.9% and 1.9%, respectively.

Conclusion:

The five hospices in Ohio utilized preferred drugs recommended by pharmacists following a medication review to identify potential drug related problems (DRPs) and encourage cost-effective drug utilization. As a result of these interventions, the utilization of expensive medications is low. Pharmacists specializing in hospice and palliative care are able to recommend preferred medications in end-of-life care thus producing cost-savings. More importantly, hospice pharmacists frequently identify DRPs which can

improve patient outcomes. Hospices should consider interventions made by pharmacists and place emphasis on the utilization of cost effective drugs that can be used among terminally ill patients to provide a high level of quality care with fiscal responsibility.

TO MY FAMILY

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CHAPTER 1

INTRODUCTION

The hospice regulations authorizing Medicare reimbursement for hospice-care services was issued in 1983 and updated in 2008. Beginning in 1984, there have been significant increases in both the number of programs offering hospice care and the number of patients who have received hospice care, especially during the past decade. According to the National Hospice and Palliative Care Organization (NHPCO), the number of patients who received hospice care in United States (US) increased from 25,000 in 1982 to 100,000 patients' in 1984.¹ In 2006, more than 1.3 million patients received hospice care from more than 4,500 hospice programs nationwide.^{1, 2} Furthermore, pediatric hospice programs have also grown as a result of community need. Pediatric patients account for approximately 1% of the hospice patients' served.³

Hospice programs are defined as a program of palliative and supportive care services providing physical, psychological, social, and spiritual care for terminally ill persons, their families, and caregivers.⁴ Many patients receiving end-stage disease treatments which have little beneficial effects (e.g., chemotherapy, tube feedings, parenteral nutrition), require skilled help in transitioning to more useful forms of supportive care, such as hospice care.⁵ The treatment focus is palliative, not curative, and is based on a biopsychosocial model rather than a disease model of care.⁶ Palliative care is treatment for relief of pain and other uncomfortable symptoms through the appropriate coordination of all aspects of care to maximize personal comfort and relieve distress.⁷

Palliative care can be provided outside of a hospice program, however hospice care is always considered to be palliative care. Hospice care allows the patient to remain at home for as long as possible by providing support to the patient and family, and keeping the patient as comfortable as possible while maintaining the patient's dignity and quality of life.

Hospice programs render services to both the patient and the family and consider them as one unit of care. Most hospice care services are provided in home or in inpatient settings (e.g., hospital, freestanding hospice facility, nursing home). Hospice services may be provided to patients in all age groups, including children, adults and the elderly.⁴ Hospice programs generally include services such as nursing care, physician services, nurse practitioner services, medical social services, and supportive services in the patient's home or in an in-patient environment. Typically, inpatient care is short-term, and is provided for control of pain and management of acute symptoms (e.g., intractable nausea, vomiting, seizures), or to provide respite care for relief of the patient's primary caregivers. Short-term inpatient hospice care may also be provided in order to prepare the patient and family for home-care services.⁸

Under current Medicare guidelines, a hospice care program is considered to be a coordinated, interdisciplinary program and generally includes services provided by a physician, psychologist, social worker, nurses, dietitians, pharmacists, rehabilitation therapists, including speech, occupational and physical therapists, clergy, and home health services. Medicare certified hospice programs provide care using a team of people

who assess the needs of the patient and the family and then develop and maintain a plan of care that meets those needs. Once a patient is admitted to an approved hospice program, the hospice provider coordinates all care related to the management of the patient's terminal illness.⁴ Currently, more than 90% of the hospice programs in the United States are certified by Medicare.⁶

Determining the Need for Hospice Services

The decision to elect hospice care services remains a difficult choice. A common obstacle to timely referral for hospice services is often the physician's perception that the patient and the family are not ready to consider hospice. In addition, predicting the time of death is difficult and often uncertain.¹¹ Some prognostic indicators of limited life expectancy are disease-specific while some are not. End-stage diseases such as cancer, heart failure, pulmonary disease, dementia, and stroke are chronic conditions that physicians frequently encounter and may require hospice referral. Other illnesses, less frequently encountered by physicians, which may result in a hospice referral, include AIDS, liver failure, chronic obstructive pulmonary disease (COPD), Alzheimer's disease and amyotrophic lateral sclerosis (ALS).⁹

In some cases, there may not be a single disease process that limits life expectancy. General guidelines published by NHPHO, previously referred to as the National Hospice Organization [NHO], 1996),⁹ may be used to help determine hospice eligibility in selected non-cancer diseases. The guidelines do not predict prognosis; however, they have been adapted by regulators as standards for hospice eligibility.¹⁰

Other assessment tools used to determine prognosis and hospice eligibility include the Functional Assessment Staging Scale (FAST), Palliative Performance Scale (PPS) and the Karnofsky Performance Scale score.¹¹

Patients who may benefit from hospice services include those who are terminally ill (i.e., life expectancy is six months or less) and who require services for the palliation or management of the terminal illness and related conditions.¹² The physician must certify (i.e., validate) that the patient is terminally ill and has a life expectancy of six months or less to live, if the disease follows its expected course. Certification from the physician is generally based on the physician's or medical director's clinical judgment regarding the normal course of the patient's illness.¹⁶ Additionally, since medical prognostication is not always exact, documentation in the medical record must support the physician's clinical judgment.

The following clinical prognostic indicators have been identified as general predictors of end-stage illness (Royal College of General Practitioners [RCGP], 2006), and may be included in medical record¹⁷:

- Multiple co-morbidities with no primary diagnosis,
- Greater than 10% weight loss over six months,
- General physical decline,
- Serum albumin < 2.5 g/dL,
- Reduced performance status (e.g., Karnofsky score < 50%), and
- Dependence in most activities of daily living.

In the event of patient survival being longer than six months, the physician must recertify that the patient is terminally ill for the hospice benefit to continue. The fact that the patient lives longer than six months, is not a reason to terminate coverage of hospice services.¹⁸

Levels of Hospice Care

Hospice care is defined by the services and care provided, in addition to the setting in which these services are delivered. According to the Medicare Hospice Benefit, there are four levels of hospice care available: routine home care, continuous home care, respite care, and inpatient care.¹⁴ More than 90% of the hospice services in the US are based in the patient's home.¹⁵

Routine Home Care: Routine home care is the basic level of care provided by the interdisciplinary hospice team to support a patient with a terminal illness. It may be provided in a private residence, a hospital residential care facility, or an adult care home. It may also be provided in a nursing facility when the facility has a contractual agreement with the hospice agency. This level of care typically requires fewer than eight hours of primarily nursing care per day and is based on the patient's individual needs. The nursing care need not be continuous. Family members and the hospice team work together to facilitate the role of family and friends as healthcare providers. Caregivers are taught how to care for the patient along with care that is provided by home health aids and skilled nursing. Typically, with this level of care, the nurse monitors the comfort level of the patient and works closely with the physician to adjust the treatment plan as needed. An

on-call registered nurse is available to provide phone support and make home visits as necessary.

Continuous Home Care (CHC): Continuous home care is provided in a patient's home and is often provided during a medical crisis that would otherwise require inpatient admission. For example, patients with out of control symptoms such as dyspnea, delirium, or pain may receive 24-hour nursing services temporarily until they are stable. A minimum of eight hours of primarily nursing care is required, half of which must be provided by a registered nurse, licensed practical nurse or nurse practitioner. The nursing care need not be continuous.

Homemaker or home health aid services may also be provided to supplement nursing care. Nursing care in the hospice setting includes but is not limited to observation and monitoring, in addition to skilled care for pain and symptom control. Hospice medical directors can make home visits during this time as needed.¹³

Inpatient Respite Care: Inpatient respite care is short-term care (i.e., five days or less per benefit period) that is provided to relieve family members and other unpaid caregivers who care for the patient in their private residence. Respite care may be provided in a hospice facility, hospital or nursing home.

General Inpatient Care/ Hospital-based care (HB): General inpatient hospice care is provided in an inpatient setting for the purpose of managing symptoms or to perform

procedures for pain control that cannot be performed in other settings. The inpatient services may be provided in a hospice inpatient facility, hospital facility, or nursing facility under the arrangement of a hospice agency.¹⁴

Different Types of Hospice Services

Medicare mandates the following core health professional service teams on the hospice team:

Nursing Care: These services must require the skills of a registered nurse or a licensed practical nurse under the supervision of a registered nurse, and must be reasonable and necessary for treatment of the patient's illness or injury. Nursing care also includes services provided by a nurse practitioner who is not considered the patient's attending physician.

Medical Social Services: These services are provided by a social worker who is working under the direction of the physician.

Physician Services: The physician services of the hospice medical director or physician member of the interdisciplinary team must be performed by a doctor of medicine or osteopathy.

Counseling Services: Different types of counseling services that may be provided, include counseling on patient's diet, bereavement services, psychological services, etc.

Short-term Inpatient Care: General inpatient care may be required for symptom management and pain control that cannot be provided in other settings. Inpatient care may be required for medication adjustment, observation or stabilizing treatment, such as psychosocial monitoring, or for a patient whose family is unwilling to permit needed care to be furnished in the home.

Medical Appliances and Supplies: These services include medical appliances and supplies, drugs and biologicals used by the hospice team primarily for relief of pain and symptom control related to the patient's terminal illness.

Home Health Aide Services: Trained home health aides, under the supervision of a registered nurse, may provide personal care services and/or perform household services to ensure a safe and sanitary environment in the home.

Physical, Occupational and Speech Therapy: These services may be provided for purposes of symptom control or to enable the patient to maintain basic functional skills and activities of daily living. Despite the election of hospice care services for end-of-life care, specific disease treatment may be required for a secondary illness. These treatments may be considered life-prolonging; however, they often eliminate adverse symptoms such as shortness of breath, physical fatigue and edema. Essentially, some treatments may be both disease-modifying and palliative. Hospice organizations may allow patients to receive treatments such as palliative radiation or chemotherapy, blood transfusion or even surgery, if necessary, to control symptoms.¹⁹

Professional Pharmacist services as such are not specifically mandated as a core requirement. However, the 2008 Medicare Hospice Conditions of Participation do require the services of a practitioner with the requisite skills to oversee the hospice medication-use process for hospice patients regardless of the hospice environment of care. Thus, most hospices today utilize a pharmacist as the health care professional responsible to the interdisciplinary team to provide oversight of the medication use process and to provide medication therapy management for the hospice patient.³⁹

Discharge from Hospice Services

In some situations, it is appropriate to discharge a patient from hospice. If the hospice team determines the patient is no longer considered terminally ill, discharge from hospice is deemed appropriate. In addition, hospice discharge may also be appropriate if the patient refuses services or is uncooperative, moves out of the area, transfers to another hospice program, or chooses to “revoke” hospice services.²⁰ To revoke the election of hospice care, the patient must file a document with the hospice that includes a signed statement that the patient revokes the election for Medicare coverage of hospice care for the remainder of that election period and the effective date of that revocation. The patient forfeits hospice coverage for any remaining days in that election period. Upon revoking the election of Medicare coverage of hospice care for a particular election period, a patient resumes Medicare coverage of the benefits waived when hospice care was elected. An individual may at any time elect to receive hospice coverage.³⁹ In the event a patient is discharged from hospice, benefit coverage would be available under core medical benefits as long as the patient remained eligible for coverage of medical services.²¹ It is recommended that the

hospice program have a discharge planning process taking into account the possibility a patient's condition may stabilize or change, and hospice services would no longer be required. Furthermore, it is recommended that the patient and family are notified that a discharge is being considered in order to allow for necessary arrangements. Prior to discharge, the hospice must obtain a written physician discharge order from the hospice medical director.²⁰

Medications as a Component of Hospice Care

Hospice programs use medications, medical equipment and supplies for symptom control and improvement in the patient's quality of life. The goal is to promote pain and symptom management to the greatest extent possible.¹⁹ Each hospice patient presents unique, rapidly changing symptom clusters, often including pain, weakness, anxiety, dyspnea, anorexia, constipation, early satiety, fatigue, and dry mouth.²² Because treatment of hospice care is palliative and time is short, creative aggressive medication regimens are crucial. As allowed by the Food and Drug Administration (FDA), clinicians use FDA-approved drugs for any reasonable purpose.²³

Pain

Despite available and effective treatments, some generalists fail to assess pain appropriately, hesitate to prescribe opioids, and hold inaccurate assumptions about pain tolerance and drug dependency.²⁴ Hospice providers take reasonable pain-management efforts. Their actions are bolstered by federal guidelines and many states laws affirming patient's rights to effective pain management.²³

Pain often has multiple causes such as soft tissue injury, tumors, bone infiltration, and nerve damage. Because patient's pain thresholds differ, no standard protocol exists. Most hospice programs follow the World Health Organization's 3-step analgesic ladder, which provides relief for 70% of patients^{25, 26} :

- A nonopioid for mild-to-moderate pain
- A weak opioid for moderate-to-severe pain with a nonopioid adjuvant
- A strong opioid for severe pain with a nonopioid adjuvant.

Opioid doses are not reduced solely for hypotension, decreased respiratory rate, or consciousness; optimal comfort defined by patient preference is the goal. Oral administration is preferred, to avoid painful injections, but medications can be administered through a different route if the patient cannot take them orally.²⁷ For bone pain, approximately, 40% of patients find relief with radiation therapy.²⁸ Adjunctive therapy is often utilized to help manage other symptoms.³⁰

Patients sometimes plead for rapid death if pain or symptom management is inadequate.³¹ In cases of retractable pain, the American Academy of Pain Medicine's position is unequivocal: "In rare circumstances, when pain and suffering are resistant to treatment, sedation may be therapeutic and medically appropriate to obtain relief if consistent with the expressed wishes of the patient." ³²

Fluid Balance

End-stage intravascular problems often lead to fluid imbalance and edema. Nausea and vomiting also contribute to imbalances. Rehydration therapy can worsen edema and lead to skin breakdown.³⁰ Practices such as offering small amounts of liquid or ice chips are often used as alternatives to intravenous (IV) therapy.³⁰ However, IV hydration may be employed to hasten excretion of drug metabolites and provide relief.²⁹

Dyspnea

Dyspnea, affecting up to 70% of hospice patients, can be a frightening experience. Labored breathing, breathlessness, and gasping suggest hypoxia, but most hospice patients are not hypoxic. Supplemental oxygen may provide little relief. Causes are often related to pulmonary edema, obstruction, anemia, electrolyte imbalance, cardiac decompensation, respiratory failure, anxiety, and lymphangitis. If possible, underlying causes should be corrected. Keeping the room cool, employing stress-management techniques, and helping the patient relax also help. Low dose opioids and anxiolytics (usually benzodiazepines) are most commonly used and are effective at relieving dyspnea.^{23, 24, 29}

Delirium

Delirium, an acute state of confusion, disorientation, and severe cognitive impairment—may be drug-induced or a consequence of dyspnea, hepatic insufficiency, vitamin deficiencies, or hypoalbuminemia.²⁴ Haloperidol, risperidone, olanzapine, and

lorazepam are often helpful. Clinicians might select a more sedating neuroleptic such as chlorpromazine for patients experiencing refractory delirium.²⁹

Cachexia

Many terminal diseases end with cachexia or wasting. Cachexia is loss of body mass that cannot be reversed nutritionally, even if the affected patient consumes more calories, lean body mass will be lost, indicating there is a fundamental pathology in place. Prevalence varies with pathology; lung cancer and AIDS often cause cachexia.^{24, 34, 35}

Agents that increase protein synthesis and decrease proteolysis often are helpful, including corticosteroids (which improve anorexia but not cachexia), and megestrol acetate and the preferred medication, mirtazepine.³⁰

Other Symptoms

Imminent death is heralded by a plethora of problems: constipation, diarrhea, skin breakdown, infections, and weakened immunity. Each terminal illness presents its own symptom constellation, many of which are iatrogenic. Not all problems are physical; anger, depression, and anxiety are common and minimize quality of life. Anxiolytics and antidepressants fortify psychological supports, but fast onset of action is imperative. For this reason, clinicians often prefer methylphenidate over other medications requiring weeks to achieve maximum clinical impact.³⁰

Procedures for Dispensing and Administering Medications

Once a patient is certified as terminally ill with six months or less to live and elects hospice services, an initial plan of care must be established, and all treatment of the patient's terminal illness must be provided by or through the hospice. Qualified personnel must perform all services.¹⁸

The hospice provides appropriate methods and procedures for the dispensing and administering of drugs and biologicals. Whether drugs and biologicals are obtained from community or institutional pharmacists or stocked by the facility, the hospice is responsible for drugs and biologicals for its patients, insofar as they are related to the terminal diagnosis and for ensuring that pharmaceutical services are provided in accordance with accepted professional principles and appropriate Federal, State, and local laws.³⁸

The procedure for the dispensing and administering of drugs is as follows
(Conditions of participation by CMS):

(1) **Licensed pharmacist:** It is mandatory for a hospice to employ a licensed pharmacist; or have a formal agreement with a licensed pharmacist to advise the hospice on ordering, storage, administration, disposal, and record keeping of drugs and biologicals.³⁹

(2) **Orders for medications:** It is the responsibility of a physician to order all medications for the patient. For verbal medication orders, the physician must deliver the orders to a licensed nurse, pharmacist, or another physician; then the individual receiving the order must record and sign it immediately and have the prescribing physician sign it in a manner consistent with good medical practice.⁴¹

(3) **Administering medications:** Medications should be administered only by one of the following individuals:

- (i) A licensed nurse or physician.
- (ii) An employee who has completed a State-approved training program in medication administration.
- (iii) The patient if his or her attending physician has approved.

(4) **Control and accountability:** The hospice must have procedures for control and accountability of all drugs and biologicals throughout the facility. Drugs should be dispensed in compliance with Federal and State laws and records of receipt and disposition of all controlled drugs are to be maintained in sufficient detail to enable an accurate reconciliation. It is the duty of the pharmacist to determine that drug records are in order and that an account of all controlled drugs is maintained and reconciled.⁴¹

(5) **Labeling of drugs and biologicals:** The labeling of drugs and biologicals is based on currently accepted professional principles, state and federal regulations, and includes the appropriate accessory and cautionary instructions, as well as the expiration date when

applicable.

(6) **Storage:** In accordance with State and Federal laws, all drugs and biologicals are to be stored in locked compartments under proper temperature controls and only authorized personnel may have access to the keys. Separately locked compartments should be provided for storage of controlled drugs (Schedule II of the Comprehensive Drug Abuse Prevention & Control Act of 1970)⁴² and other drugs subject to abuse, except under single unit package drug distribution systems in which the quantity stored is minimal and a missing dose can be readily detected. An emergency medication kit is kept readily available.

(7) **Drug disposal:** Controlled drugs no longer needed by the patient are disposed of in compliance with State requirements. In the absence of State requirements, a pharmacist and a registered nurse dispose the drugs and prepare a record of the disposal.⁴¹

Value of Pharmacists in Hospice Care

The American Society of Health-Systems Pharmacy (ASHP) suggests that high-quality hospice and palliative care requires both, traditional and expanded pharmacist activities, including a variety of clinical, educational, administrative, and support responsibilities such as⁴⁰:

- Assessing the appropriateness of medication orders and ensuring the timely provision of effective medications for symptom control
- Counseling and educating the hospice team about medication therapy

- Ensuring that patients and caregivers understand and follow the directions provided with medications
- Providing efficient mechanisms for extemporaneous compounding of nonstandard dosage forms
- Addressing medication related financial concerns
- Ensuring safe and legal disposal of all medications after death
- Establishing and maintaining effective communication with regulatory and licensing agencies

A pharmacist can also be useful in improving the cost-effectiveness of pharmacotherapy for symptom control in hospice care through patient-specific monitoring for drug therapy outcomes, recommending alternative drug products and dosage forms, minimizing duplicative and interacting medications, compounding of appropriate medications, improving drug storage and transportation, and educating staff, patients, and families about the most effective ways of handling and using medications. Systems for documenting these activities and determining cost-effectiveness/cost–benefit/cost–utility ratios of medications used in the care of terminally ill patients are needed. Avoidance of admissions to hospitals or long-term-care facilities through improved symptom control is a highly desirable and cost-effective outcome of pharmaceutical care for hospice and palliative care patients.

PROBLEM STATEMENT

Clinical pharmacists at hospices see an average of 10 drug-related problems per patient upon admission.⁵⁷ Studies have shown that as polypharmacy increases, the rate of drug-related problems increases as well.⁵⁷ A few of these problems include medications prescribed with no indication, potential or actual adverse drug reaction detected, dose too high, dose too low, medications indicated but not prescribed and inappropriate medications..

If the medication is not appropriate for the patient, this may result not only in unnecessary medication costs, but also result, in high costs, and unnecessary suffering associated with untreated symptoms. For example, the use of antiemetics for nausea/vomiting due to constipation from opioids will be poorly efficacious and not cost-effective. Since the root cause of the symptom (nausea/vomiting) is constipation, medication for constipation should be prescribed, such as a laxative instead of an antiemetic.

The appropriate selection of medications results in better symptom control, fewer nursing visits, fewer on-call demands, fewer hospitalizations and ER visits, and fewer medication-related liability issues. The use of unnecessary medications should be avoided in terminally ill patients, and hospice programs should not be burdened with costs related to unnecessary medication use, which can be easily avoided.

All hospices should consider employing clinical pharmacists. Some hospices employ full-time pharmacists, while others sub-contract for this service. Employing clinical pharmacists through the relationship of a Pharmacy Benefit Manager (PBM) for reconciliation of medication may be considered as the best option. United States PBMs administer prescription drug plans which provide over 3 billion prescriptions) for more than 210 million people (70% of entire U.S. population) as part of health coverage provided through Fortune 500 employers, health insurance plans, labor unions, and Medicare Part D.⁶² There are PBMs that partner exclusively with hospices and provide numerous services pertinent to hospices, such as clinical consultations, education programs, management reports and summaries including but not limited to drug utilization review reports.

PBMs emerged in the 1980s, primarily to provide cost-effective drug distribution and claims processing for the healthcare industry. The PBM industry further evolved in response to the significant escalation of healthcare costs in the 1990s, as sponsors of benefit plans sought to more aggressively contain their costs. PBMs developed strategies to effectively influence both supply and demand. Through purchase discounts, retail pharmacy networks, mail order pharmacy services, preferred drug list administration, claims processing and drug utilization review, PBM companies created an opportunity for health benefit plan sponsors to deliver prescription drugs in a more cost-effective manner while improving compliance with recommended guidelines for safe and effective drug use.

Despite many of advantages of PBMs, many hospices remain reluctant to employ PBMs for medication review. Successful medication related interventions can bring substantial cost savings and effective therapies in hospice care. Further studies need to be conducted focusing primarily on the utilization and costs of medications, or impact of pharmacist-led intervention leading to cost-effectiveness in hospice care.

OBJECTIVES OF THE STUDY

The overall objective of this study was to identify and analyze medication related costs as well as medication utilization in hospice care.

The specific objectives were:

1. Describe patient-related and hospice-related characteristics such as gender, average length of hospice stay, primary diagnoses, average daily census, number of admissions per year, net operating revenues, inpatient unit (IPU) operating costs, and medication expenditures among hospice patients.
2. Compare patient-related and hospice-related characteristics of five hospices in Ohio with National Hospice and Palliative Care Organization (NHPCO) data.
3. Identify and analyze therapeutic drug classes with the most frequent utilization rates and largest percentage of expenditures in hospice care.
4. Identify and analyze utilization and cost for medications in hospice care.

CONCEPTUAL FRAMEWORK

For our study, five hospices in Ohio agreed to participate and were requested to send their 12-month medication cost and utilization data. These five study hospices are non-profit organizations that employ a pharmacy benefit manager (PBM) for prescription drug programs. A PBM is a third party administrator of prescription drug programs. They are primarily responsible for processing and paying prescription drug claims. They are also responsible for developing and maintaining the medication formulary, contracting with pharmacies, and negotiating discounts and rebates with drug manufacturers. PBMs contract with managed care organizations, self-insured employers, insurance companies, unions, Medicaid and Medicare managed care plans, the Federal Employees Health Benefits Program and other federal, state, and local government entities to provide managed prescription drug benefits. Due to their larger purchasing pool for prescription drugs, PBMs can negotiate rebates and discounts on behalf of their clients.

The PBM claims data have an advantage, for they can be used for a variety of purposes, including studying the care received by dying patients. Claims data generally encompass a wealth of variables which facilitate ease in identifying diagnoses and procedures, help in broadly looking at timing (specific days for hospitalizations, length or span of days for hospice, home care), and to determine intensity of hospice care (routine, continuous, or inpatient).

For this study, PBM claims data were employed to conduct a retrospective study.

PBM claims data consist of information on drug costs and prescription drug count. Such claims data were collected and obtained from five hospices in Ohio. Annual data from January 1, 2007 through December 31, 2007 of the five hospices were combined to form a dataset which contains information regarding prescription medication utilization and their costs, including information on therapeutic class of medications, drug names, total cost and prescription medication count. The dataset comprises of at least 1,020 different medications classified under 250 (approx.) different therapeutic classes of medications.

Additionally, hospice participants were asked to report data for the most recently available 12-month period, patient-related (gender and average length of stay) and hospice-related (number of admissions per year, pharmacy costs, physician salary, nursing salary and bereavement costs) characteristics. These reports were obtained individually from each hospice which assisted to understand patient demographics and the overall costs incurred in a hospice.

Retrospective analyses of these PBM claims data were conducted to identify expensive specialty and even inexpensive maintenance medications. Such analyses can be conducted quickly regardless of the huge sample size of claims database and are relatively inexpensive to perform. These analyses helped identify the ten most frequently utilized and expensive therapeutic classes of drugs in a hospice. Furthermore, they also allowed us to examine the differences in prescription drug count and total cost by therapeutic class and by drug name for each hospice and for all hospices combined.

Besides, medication data from the five hospices were compared to one another to examine difference in medication use by hospices.

NEED FOR THE STUDY

The overall costs for hospice care to Medicare, other third party payers and patients may be less as compared to the costs incurred by conventional care, but the cost for medications in a hospice program could be high, which can be effectively reduced by medication review. Especially, with the introduction of the Affordable Care Act (ACA), it has become imperative for all health care institutions to provide patients with high quality services with minimal costs. Pharmacists specializing in hospice and palliative care are able to recommend appropriate and effective drug therapy as an alternative to high cost, high risk medications and produce cost-savings. The pharmacists also identify drug related problems (DRPs) which can influence better patient outcomes in hospice care.

A technique to ensure that hospice patients gain maximum benefit from their medications, while simultaneously reducing the potential for harm and improve health outcomes is essential. Achieving these goals is at the heart of successful medication review that has been defined as a structured, critical examination of a patient's medicines with the objective of reaching an agreement with the patient about treatment, optimizing the impact of medicines, minimizing the number of medication-related problems, and reducing waste.

It has also been assumed, although based on little high quality evidence, such measures will lead to important gains for health systems by reducing hospital admissions and inappropriate drug prescribing. Such gains hold great appeal for policymakers when taken in combination with the apparent benefits to patients.⁵ With this underpinning rationale in mind, medication reviews have been widely introduced and are increasingly undertaken by pharmacists operating separately from the physicians involved in prescribing decisions.

Over the past five years, clinical trials have shown growing evidence of better outcomes generated due to interventions such as pharmacist-led medication review. These trials have varied in terms of target population (older people generally, or those with a specific disease), numbers of pharmacists, and location of the intervention (home, pharmacy, general practice, hospital, or a hospice). The primary outcome has also varied, including reduction of drug related problems, adverse drug reactions, hospital admissions, and/or improving medication appropriateness.⁶⁵

Medication review, like medications themselves, has the potential to yield benefits. This intervention delivered by professionals not primarily responsible for prescribing decisions such as Pharmacy Benefit Managers (PBM), should be expected to adequately demonstrate not just effectiveness but also cost-effectiveness before being introduced more widely. PBMs employ variety of tools to demonstrate and produce effective pharmacy benefit management, thereby recommending utilization of cost-effective medications. Formularies are central to these management efforts. By placing

such cost-effective medications on hospice formulary, PBMs facilitate control of costs to hospices.

Previous studies have evaluated the impact of pharmacist-led interventions in terms of clinical outcomes. However, there is a dearth of information related to economics of medications in hospice care. Thus, there is a need for studies that place emphasis on reviewing and analyzing the costs and utilization of usage of medications.

Since the five hospices in Ohio employ preferred drugs recommended by pharmacists following a medication review to identify potential drug-related problems (DRPs) and encourage cost-effective drug utilization, this study will provide an in-depth knowledge of the cost of medications in hospice and study the impact of pharmacist-led interventions on cost savings in hospice care. In addition, PBM claims data obtained would have important implications for pharmacist's interventions facilitating identification of important medications utilization issues that contribute to significant expenditures in hospice care, which will serve as a benchmark in the field of hospice.

CHAPTER 2

LITERATURE REVIEW

A comprehensive review of the literature on hospice care in United States was conducted to identify articles published from 1984 to 2007. The articles were accessed from search engines such as Medline and Google Scholar. Initial or primary searches were made using the keywords ‘hospice care’ which resulted in a total of 3,674 articles, out of which only 59 articles were found to be useful for the study. After reviewing those articles, only 16 articles relevant to costs and medication utilization of hospice care were used for the study. Further secondary searches were made using keywords such as ‘hospice medication use/utilization’, ‘hospice drug use’, ‘palliative care medications’, ‘hospice patient characteristics’, ‘hospice care costs’, ‘hospice care economics’, ‘hospice cost-effectiveness’, ‘terminally ill costs’, ‘terminally ill economics’, ‘pharmacists and hospice’, ‘pharmacy benefit management and hospice’, and ‘pharmacist-led intervention and hospice’. A combined total (articles found from primary and secondary investigations) of 27 articles were used in this research paper.

The term ‘hospice’ was coined hundreds of years ago, but has become familiar worldwide only recently. The term “hospice” was used in the 1800s for places where travelers used to rest. It was only later in early 1900s that hospices were used to provide care for the dying or terminally ill through simple palliative and supportive services. The first hospice program in the US was established in 1974. Hospices promoted peace, comfort, and dignity, rendering philanthropic support to provide care to terminally ill or

dying patients. Furthermore, hospice emerged as a philosophy or concept of care and the use of hospices increased drastically after the provision of partial reimbursement to Medicare hospice patients by Federal Legislation (1983).⁴³

It was after 1983, that several research studies on hospice care were conducted, that focused on the characteristics of patients using hospice services and on the economics of hospices. The first major development in the structure of hospice services was the National Hospice Study (NHS, 1984).⁴⁴ In the course of this study, definition and structure of hospices emerged. This study provided data on hospice patient characteristics and expenditures which demonstrated that the model of hospice which evolved from the original philosophy, under Medicare guidelines, differed substantially in services and structure from conventional medical care of the terminally ill or dying patients. Several studies were conducted later on a smaller scale that examined the same or various aspects of hospice care.

Characteristics of Hospice Patients

Hospice services are available to any individual electing the service regardless of his/her age, race, marital status, income level, diseases, etc. In recent years, there has been considerable increase in the use of hospice services by younger patients (younger than 65 years). In 2006, an estimated 17% of patients younger than 65 years were receiving hospice care compared to less than 10% in 1984.⁴⁵

Low hospice care utilization rates have been observed among the non-Caucasian

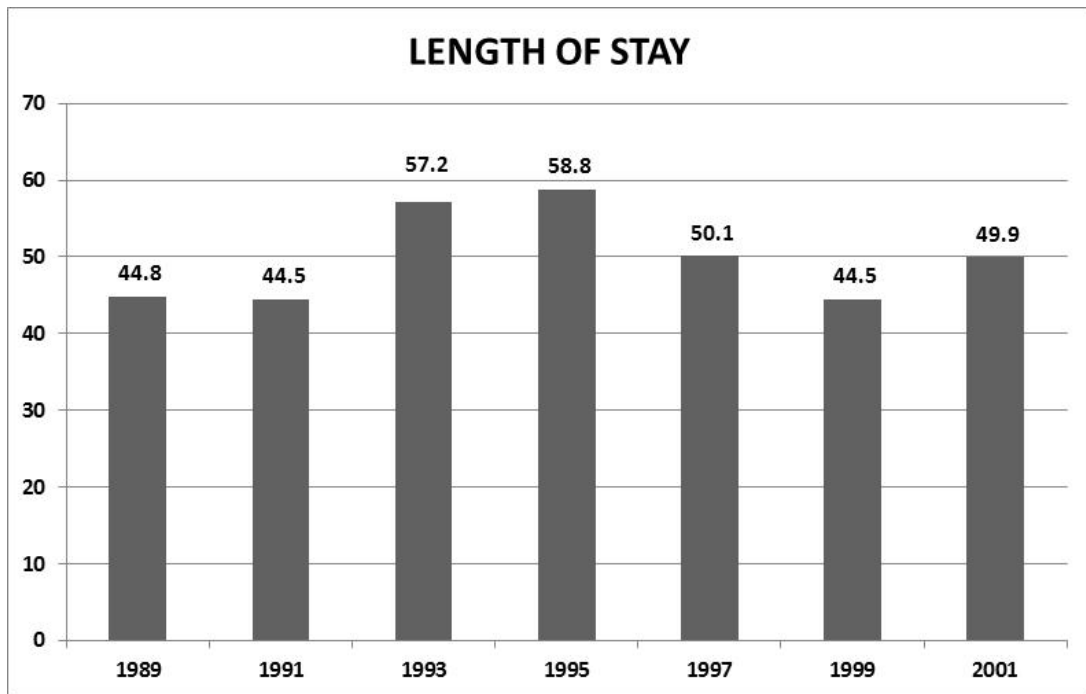
population. The number of African-American patients utilizing hospice services dropped from 8.1% in 2002 to 7.5% in 2005, although, this percentage moved up to 8.2% in 2006. Several causes for underutilization among the African-Americans and other ethnic minority groups have been proposed. These include the lack of knowledge about hospice services, different cultural beliefs; and high costs of health care.⁴⁶

Utilization of hospice services is affected by geographical location. Previous studies suggest that utilization of hospice services is positively associated with ‘urbanity’ indicating that more patients utilize hospice services in urban areas than in rural areas. This positive association with urbanity in the utilization of hospice service is potentially due to the lack of awareness about hospice services in rural areas; and that there is more awareness among the urban population which leads to more utilization & expenditures on health-related issues as compared to rural population.⁴⁷

Length of Stay in Hospice/Length of Hospice Service (LOS)

Typically, the length of hospice stay or length of hospice services (LOS) is not longer than 90 days. The place of delivery of hospice service largely influences the LOS. It was observed that the inpatient respite care and hospital-based care have shorter LOS compared to home-based care. The skewed length of hospice service was found to be 72.5 days for hospice service rendered at home and 62.3 days for hospice service rendered at hospitals.⁴⁸ Medicare hospice data shows that the LOS for Medicare hospice recipients decreased from early 1990s to 2001.⁴⁹ (Refer Figure 1)

Figure 1. Variation in length of service provided to Medicare hospice recipient.



Disease Diversity Among Hospice Patients

Patients suffering from various diseases can elect to receive hospice care. Unlike previous years, when hospice programs were in the process of nationwide establishment (1985), cancer patients accounted for most (90%) of the population; now, a higher number of non-cancer patients are observed electing for hospice services. These may include patients suffering from various non-cancer diseases such as heart diseases, lung diseases, dementia including Alzheimer's disease, stroke, coma, HIV/AIDS, liver diseases, etc.⁵⁰ In 1992, non-cancer patients accounted for 24% of all hospice patients. Furthermore, based on 2006 NHPCO estimates, the percentage for non-cancer patients electing hospice services has grown steadily from 39% in 2000 to 50% in 2002 to 55.9% in 2006.⁵¹ (Refer Figure 2)

Cost of Hospice Services

The Hospice Association of America suggests that the overall cost of hospice care per patient increased from \$3,020 (1989) to \$ 6,228 (2001) (Refer Figure 3).⁵² With this kind of rising cost of health care, a considerable concern in the US has emerged in the past decade. Efforts have been made to minimize health care costs, which in turn impose pressure on the hospice, to deliver optimum care to patients at a lower cost.⁵³

Figure 2. Variation in proportion of cancer patients versus the proportion of non-cancer patients enrolled in hospice programs from 1985 to 2006.

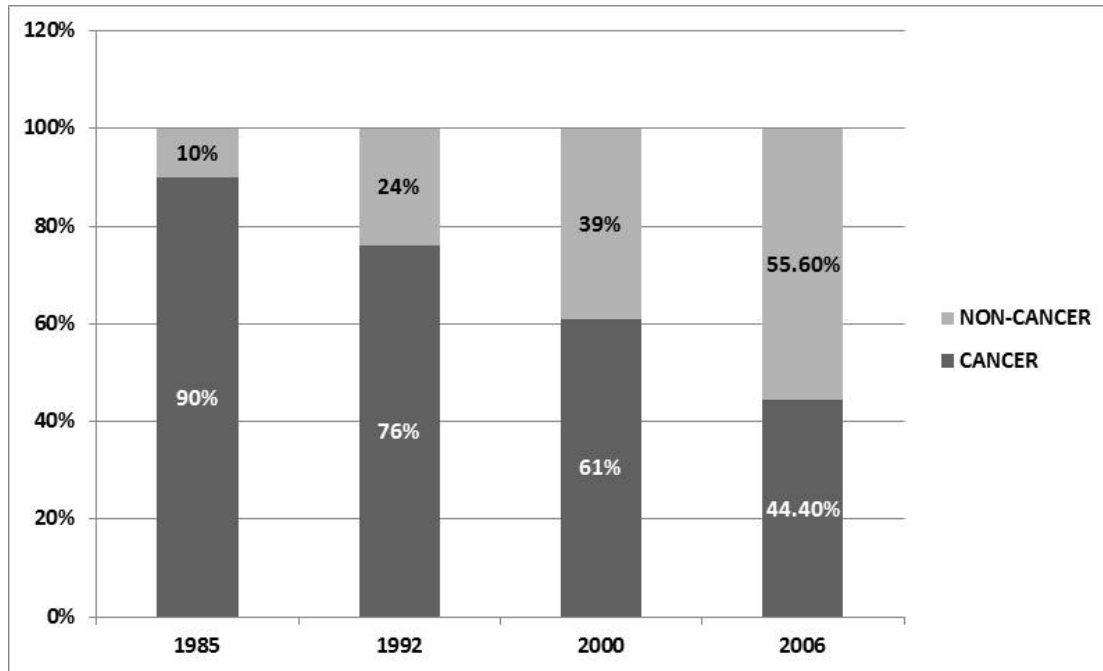
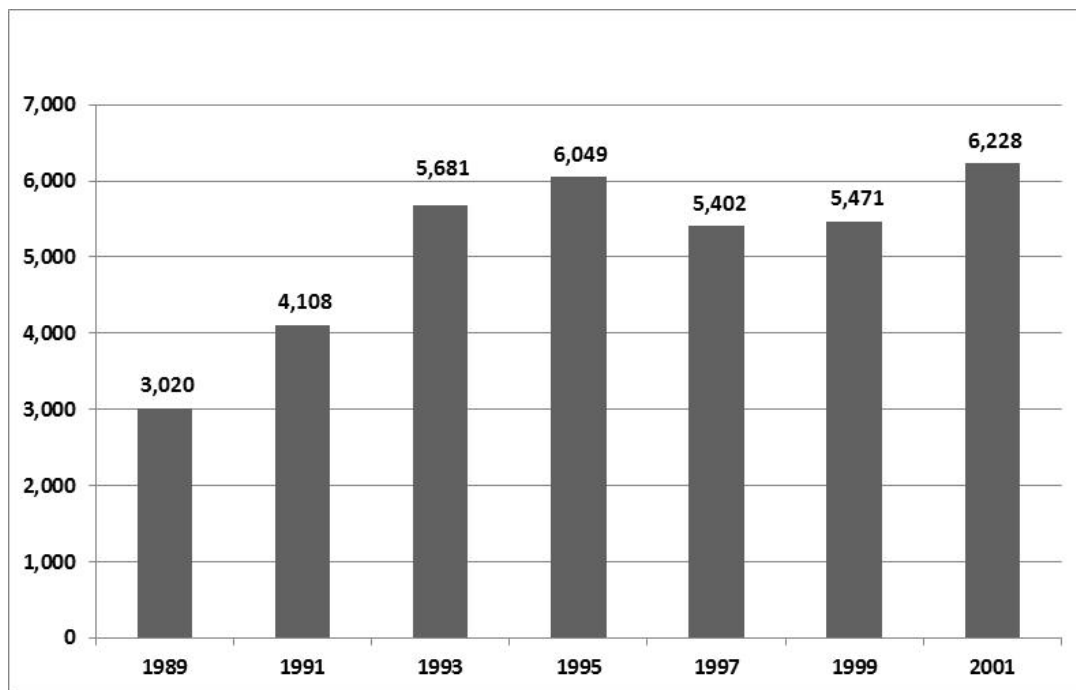


Figure 3: Costs of hospice care per patient in the United States from 1989 to 2001.



Medication Utilization

Pain management and symptom control are two of the most important goals of end-of-life care, and the use of opioids for this purpose is extremely common in hospices. Previous studies have suggested morphine to be the most utilized drug for pain control. Approximately, 70% of hospice patients receive morphine for pain control. Moreover, a fairly strong correlation exists between morphine dosage and some clinical-demographic data. A study revealed that male and nonwhite patients required slightly higher dosages than others.²⁵ In addition, primary breast and genitourinary cancers, as well as metastases to bone and spinal diseases, were associated with higher morphine dosages.⁵⁴ Other analgesic medications that are most commonly used in a hospice setting are long-acting morphine sulfate (25.4 %), acetaminophen and hydrocodone combinations (20.1 %) and NSAIDS (17.1 %).⁵⁵

Constipation is a common problem for hospice care patients and can generate considerable suffering for patients due to both the unpleasant physical symptoms and psychological preoccupations that can arise. Constipation may arise as a side-effect of opioid therapy.⁵⁷ In an effort to find a relationship between laxative use and opioid use among the terminally ill patients, Sykes (1998) found that laxatives were required by 87% of patients taking oral strong opioids and 74% of those on weak opioids. The most commonly prescribed laxatives/cathartics were senna, docusate sodium, etc.⁵⁸

Anxiety and depression are other commonly observed symptoms among terminally ill patients. These symptoms are experienced among a quarter of terminally ill

patients. Patients may be treated by use of anti-anxiety medications and antidepressants at a hospice. However, use of the antidepressant medications for treating depression and, in some cases, anxiety disorders has not been well studied in hospice. Some of the antidepressant medications may also serve as adjuvant therapy in pain management.⁵⁹

A study by Williams (1999) analyzed the antidepressants prescribed among the terminally ill. It was found that the majority of patients who were on anti-depressant medications suffered from cancer such as lung cancer (26%), breast cancer (43%), colorectal cancer (15%) and prostate cancer (11%). The most commonly prescribed medications were selective serotonin reuptake inhibitors (70%) and tricyclic antidepressant medications.⁶⁰

When all other possible interventions have failed for the relief of one or more intractable symptoms (physical, psychological and spiritual) and when relief of refractory symptoms need to be achieved in terminally ill patients, palliative sedation must be considered. Rosseau PC (2004) studied the medication utilized for palliative sedation in hospice care. Benzodiazepines and barbiturates were found to be the most commonly administered medications for achieving palliative sedation in terminally ill patients. Midazolam, lorazepam, haloperidol, pentobarbital, phenobarbital and propofol were the recommended medications for achieving palliative sedation.⁵⁶

A study by Haughtevd and colleagues (1994) made efforts to evaluate the cost to a hospital pharmacy department of providing pharmaceutical services for a hospice program. Drug acquisition costs were tabulated for all prescriptions dispensed to patients

in the hospice program from April 1, 1992, to March 31, 1993. Direct time studies were conducted to determine the average personnel time involved in dispensing a prescription for a hospice patient. To determine the personnel time associated with auxiliary activities, self-reporting and work-sampling techniques were used. Indirect and delivery costs were also calculated. Relevant resource inputs were identified, measured, and valued by using both observation and pharmacy records. A total of 5,640 hospice prescriptions were dispensed by the outpatient pharmacy; representing 30% of all prescriptions dispensed. The average cost of dispensing a hospice prescription was \$14.91. The total annual cost of providing pharmaceutical services to the hospice's patients was \$196,607, and the total annual reimbursement received from the hospice program and self-paying patients was \$155,623; therefore, costs exceeded revenues by \$40,984. The cost to a pharmacy department of providing pharmaceutical services to patients in a hospice program substantially exceeded revenues.⁶¹

In general, very few studies have looked into the areas of medication utilization, especially the costs of these medications for hospices. Since there were no data describing these costs for hospice programs in 2004, Nowels and colleagues (2004) conducted a cross-sectional survey study in hospices of the Population-based Palliative Care Research Network (PoPCRN). PoPCRN was formed in 1998 at the University of Colorado, Denver School of Medicine as a means for conducting on-going studies of care at the end of life. Specifically, their aim is to facilitate structured and rigorous exploration of issues of importance to patients, families, caregivers, and providers in palliative care and hospice settings. Since its inception, PoPCRN has grown to include 279

hospice/palliative care organizations from 49 states in the United States and also includes Canada, Australia, Italy, Portugal, and the UK.

The Web-based survey consisted of 31 questions describing structural and operational features of respondent organizations, aspects of the supply and delivery of pharmaceuticals for hospice patients, cost controls employed by the respondent organization, drug costs per patient per day (PPPD), perceived trends in drug costs, and factors contributing to those trends. Participating hospices were asked to report their most recent 12-month data. The study analyzed data from 34 hospices concerning their pharmaceutical cost trends. Most respondents reported higher pharmaceutical-related costs between 1998 and 2002, but a significant minority reported that their costs had decreased.

Pharmaceutical costs reported in the 2004 study varied by patient setting with median daily costs of \$8 (long-term care setting from), \$11 (home-care hospice setting), \$11.31 (routine level of care), \$15 (general inpatient care), and \$18 (inpatient care). The respondents identified a variety of medications and their delivery systems as contributing to their major medication costs. Long-acting opioids and continuous-infusion delivery systems were the two most significant contributors. Strategies to control errors included screening drug on admissions, a preferred drug list, a consulting pharmacist, efficacy criteria for continuation of high cost drugs, a formulary, a pharmacist on staff of hospice, and more restrictive admission policies. Certain restrictions were developed on some drug classes such as cell stimulants, chemotherapy, total parenteral nutrition,

bisphosphonate, anticoagulants, cardiac pressor agents, intravenous fluids for hydration, opioids-long acting, antibiotics, continuous infusion, and parenteral medications.⁶²

Lee and McPherson (2006) studied the value of pharmaceutical care recommendations made by consultant pharmacists and their outcomes. The study was conducted at three hospice programs, and the investigators were consultant pharmacists who shared the responsibility of providing drug therapy recommendations to these three programs. They conducted literature searches to determine if any tools had been developed to evaluate recommendations made by pharmacists in clinical practice settings. One tool was identified and adapted for use in a hospice clinical setting. Drug-related problems (DRPs) ($n = 98$), clinical interventions ($n = 87$), and outcomes data were collected by two hospice consultant pharmacists and evaluated by a panel of experts using the assessment tool. Ninety-eight interventions were collected and evaluated. Eighty-seven of the 98 interventions were classified as clinical interventions with specific therapeutic goals established. Of these 87 interventions, 73 (84%) were accepted by the prescriber and 56 (77%) out of the 73 helped achieve the therapeutic goals. An additional 6 (8%) interventions partially achieved the therapeutic goals. Over 75% of all of the pharmacists' recommendations achieved their intended therapeutic effect, which resulted in better management of the patients' physical symptoms. None of the accepted recommendations resulted in the patient having an adverse effect. Overall agreement between raters for severity and value was moderately high, 60-70% and 63-80%, respectively.⁶³

Guignard (2003), studied the economic impact of community pharmacists' interventions following the detection of problems related to nonsteroidal anti-inflammatory drugs (NSAIDs), whether in a prescription or self-medication format. The evaluation focused on the gastroduodenal adverse events that could be avoided and the subsequent savings of healthcare resources spent on treating these adverse effects. A previous study conducted during a 12-week period in 924 French community pharmacies provided the number of interventions for drug-related problems concerning NSAIDs. A simulation model was constructed to compare 2 strategies: a systematic pharmacist's intervention and the absence of intervention. The base-case patient was assumed to have been taking an NSAID for 3 months. The model's inputs were extracted from medical literature and from an institutional medical database. In this study, 608 interventions were the results of NSAID-related problems. All of these interventions reduced the risk of gastrointestinal adverse events and avoided a total cost of Euros 37,300. This model indicated that the dispensing of NSAIDs by pharmacists and related pharmaceutical care activities have a positive impact by reducing the number of gastrointestinal complications. The model quantifies the costs thus avoided. It also underlines the necessity of effective collaboration between the prescriber and the pharmacist if optimal patient management is to be achieved.⁶⁴

The above studies suggest that greater efficiencies, a change in the pricing structure, or both may be necessary to control drug costs. However, this is possible by employing a consultant pharmacist or a pharmacist on staff of the hospice. High-quality

hospice and palliative care requires both traditional and expanded pharmacist activities, including a variety of clinical, educational, administrative, and support responsibilities.

Our study is based on analyzing the utilization and costs of medications in hospice care that employ PBMs to manage drug benefits and it would be interesting to observe the cost-savings produced by these hospices.

CHAPTER 3

METHODOLOGY

Previous chapters illustrated the role of pharmacists in hospice care and the PBM-hospice relationship. This chapter will discuss the data used for the study and the methods used to achieve the study objectives.

Pharmacy Benefit Manager's (PBM) claims data are one of the "best sources" of information for identifying key components of an effective pharmacy plan and for measuring results that reside within the data. It facilitates conducting retrospective analysis to not only find medication utilization and costs, but also help in predicting future costs, trends and needs.

To study our objectives, five hospices in Ohio agreed to participate in the research study and made their PBM claims data available to the researchers. These hospices employ a PBM with consultant pharmacists to review medications, plan a formulary, and help reduce medication costs. PBM claims data for year 2007 (January 1, 2007 through December 31, 2007) were obtained individually from these five Ohio hospices and combined into a single dataset. The data was received in Excel format which was sorted by number of prescriptions in descending order (Prescription [Rx] Count). The data provided retrospective insurance claims data for the prescriptions fills of patients served by the five hospices. The study was then conducted post approval of Duquesne Institutional Review Board.

To maintain confidentiality, the five hospices were named hospice 1, hospice 2, hospice 3, hospice 4, and hospice 5. The dataset reflects utilization and expenditures related to 246 therapeutic classes and 1,020 medications utilized in these five hospices and is comprised of different variables such as therapeutic class, drug names, prescription count (Rx Count), and total cost. These variables helped identify therapeutic classes and medications that contribute to most frequent utilization rates and largest percentage of expenditures in hospice care. These variables were defined for the study as follows:

Therapeutic Class of Drugs

The medications utilized in each of the hospices are classified under 246 different therapeutic classes. This variable will help identify the different therapeutic classes of medications utilized in hospice care.

Drug Names

Drug names are the prescription medications dispensed to a hospice patient served at a hospice agency. The data includes information on 1,020 different drug names and these drug names were generic, brand or both. This variable was used to identify the important medications categorized under different therapeutic classes.

Prescription (Rx) Count

Each dataset received was sorted by prescription count. This variable is defined as the total number of prescriptions dispensed for each medication in a hospice. It is an ordinal variable and the value of Rx count ranges from 1 - 990.

Total cost

This variable is defined as the sum of the cost of prescriptions for each medication. It is an ordinal variable. In the study, this variable was used to compute the total cost for all medications prescribed in a hospice and was also used to identify important therapeutic classes and medications with largest percentage of expenditures.

STATISTICAL REPORTS

In addition to the claims data, statistical reports for hospice patient-related (gender, primary diagnoses, and average length of stay) and hospice-provider (number of admissions per year, average daily census, total patient days, nursing salary, physician salary, bereavement costs and pharmacy costs) characteristics were obtained separately from each hospice. A mean for each of these characteristics obtained from the combined data of five hospices was reported and compared to 2007 National Hospice Palliative Care Organization (NHPCO) data. .

NATIONAL HOSPICE AND PALLIATIVE CARE ORGANIZATION (NHPCO)

REPORTS

Founded in 1978, the National Hospice and Palliative Care Organization is the oldest and largest nonprofit public benefit organization devoted exclusively to hospice care. NHPCO is dedicated to promoting and maintaining quality care for terminally ill persons and their families, and to making hospice an integral part of the U.S. health care

system. NHPCO collects data annually from nationwide hospices to provide reports or summary on different aspects of hospice care such as characteristics of patients and hospice-provider, costs components of hospice care, etc.

In order to compare the hospice in Ohio with hospices nationwide, the 2007 NHPCO Facts and Figures Report was utilized. NHPCO provides comparative reporting for the following tools that evaluate clinical care and services: the Family Evaluation of Hospice Care (FEHC), the Family Evaluation of Bereavement Services (FEBS), the Family Evaluation of Palliative Care (FEPC), and the End Result Outcome Measures (EROM). NHPCO offers agency and national level reporting for the Survey of Team Attitudes and Relationships (STAR), the only job satisfaction tool specific to the hospice field. NHPCO also provides results for the National Data Set (NDS) that are reported at the national and state level. Both STAR and the NDS are valuable organization and program evaluation tools.

In order to address the objectives of the present study, the 2007 annual report of NDS was utilized. The NDS is comprised of program level descriptive statistical information that provides a comprehensive picture of hospice operations and care delivery. NDS data are used to answer key questions such as who is providing hospice care, who are the patients receiving that care, and how much and what kind of services were provided. NHPCO releases its findings on an annual basis to the media and key governmental agencies as well as members.

The primary source of these findings are the hospice and palliative care providers who participate in NHPCO's National Data Set (NDS), an annual online survey supported by many of their state organization partners. Data from the NDS survey is supplemented by information NHPCO gathers from other sources. In general, the fact and figures report provides an annual overview of important trends in the growth, delivery and quality of hospice care across the country. The overview provides specific information on:

- Hospice patient characteristics (e.g., total patients served, gender, age, ethnicity, race, primary diagnosis, and length of service);
- Hospice provider characteristics (e.g., total number of providers, organizational type, size, and tax status);
- Location and level of care; and
- Role of paid and volunteer staff.

Hospice Patient-related Characteristics

Hospice patient-related variables that were included in the analysis were gender, length of service (LOS) and primary diagnoses. These variables are described as:

Gender

The variable is described as indicator of sex, and is utilized in this study to identify the gender of the hospice patient.

Length of Service (LOS)

Mean LOS and median LOS were obtained from the hospices to find the average LOS provided to hospice patients. LOS is calculated from the date of enrollment to hospice service until the death or discharge of the patient from the hospice service.

Primary Diagnoses

Primary diagnoses were used to identify the terminal disease, for which is the reason for which they were enrolled for hospice care. Primary diagnoses were categorized into cancer and non-cancer. Non-cancer category was further sub-categorized into heart diseases, dementia/Alzheimer, lung diseases, kidney diseases, HIV/AIDS, stroke/come, ALS, debility unspecified and other.

Hospice Provider-related Characteristics

These include all the characteristics of a hospice agency such as average daily census, number of admissions per year, total patient days, net operating revenues per year, annual inpatient unit operating costs, annual pharmacy costs, physician salary, nursing salary and bereavement costs.

Number of Admissions Per Year

It is defined as the total number of patients enrolled for hospice services per year.

Average Daily Census (ADC)

Average daily census represents the average number of eligible patients receiving hospice

care service on a given day, inclusive of all patients receiving home care and in inpatient unit. In general, it is the average of all patients enrolled for hospice care per day regardless of the place where service is provided.

Net Operating Revenues

This is the amount accrued by net sales or other regular income related to the operations of a hospice care agency.

Inpatient Unit (IPU) Operating Costs

This term includes the costs that are associated with all the services provided at a hospice inpatient unit such as cost of a room/bed.

DATA ANALYSIS

The data analysis was conducted using SPSS (version 15.0). The data was transferred from Excel to SPSS for ease of manipulating data and conducting statistics. Data were then checked for accuracy and missing data or incorrect data (3%) were deleted. The first two objectives of the study were achieved by conducting a statistical report for year 2007. For all the other study objectives, PBM claims data from all study hospices combined for year 2007 was utilized.

Objective 1: Describe patient-related and hospice-related characteristics such as gender, average length of hospice service, primary diagnoses, average daily census, number of

admissions per year, net operating revenues, inpatient unit (IPU) operating costs and pharmacy costs.

Five statistical reports provided by the five hospices for year 2007 were utilized to achieve this objective. A mean for each of the patient-related and hospice-related characteristics was calculated from the five statistical reports obtained from the five hospices in Ohio.

Objective 2: Compare patient-related and hospice-related characteristics of the five hospices in Ohio with NHPCO data.

For this objective, statistical reports from the five hospices as well as the annual reports of NHPCO for year 2007 were used. The mean or average for the characteristics obtained from objective 1 was used to compare with NHPCO data. The characteristics that were compared were gender, average length of hospice service (LOS), primary diagnoses, average daily census, and total patient days.

Objective 3: Identify therapeutic drug classes and medications with the most frequent utilization rates and largest percentage of expenditures in hospice care.

A) For combined dataset

Combined PBM claims dataset from all study hospices was used to achieve this objective. Descriptive analyses were conducted to identify ten therapeutic classes based on Rx count and total cost. The frequencies (sum) of Rx count and sum of the total costs for medications under each therapeutic class were computed. The ten therapeutic classes with highest Rx count and ten therapeutic classes with highest total cost were reported.

Similar statistics were conducted to identify ten medications based on Rx Count and total cost and results were reported.

B) For individual hospice data

Individual hospice data for hospice 1, hospice 2, hospice 3, hospice 4, and hospice 5 were used for this objective. Descriptive analyses, similar to objective for combined dataset were conducted to identify five therapeutic classes and five medications based on Rx count and total cost for each of the hospice.

Objective 4: Further analyze medication costs and utilization rates under the identified therapeutic class of medications.

Descriptive analyses were conducted to find frequencies (sum) of Rx count and total cost for each medication under each of the ten different identified therapeutic classes. Five medications whose frequency of use contributes to largest expenditures under the identified therapeutic classes were reported.

The next chapter will discuss the results obtained by making use of the data and methodology.

CHAPTER 4

RESULTS

Previous chapters provided an overview of hospice care, outlined the specific study objectives, discussed some studies that have analyzed hospice characteristics and medication utilization in hospices, and described the study methodology and data sources. This chapter presents the results for each of the study objectives.

Individual PBM data from the Ohio hospices were employed to analyze therapeutic classes and medication utilization. Combined dataset from all five hospices were analyzed to study the overall medication utilization among these hospices. This combined dataset consisted of 1,020 different drug names under 246 therapeutic classes.

For the study objective 1, statistical reports obtained from five hospices in Ohio for year 2007 were evaluated; while for objective 2, both statistical reports from five Ohio hospices and NHPCO reports were evaluated.

Objective 1: Frequency of Patient- and Hospice-related Characteristics

An average for all the patient- and hospice-related characteristics included in the statistical reports of study hospices in Ohio was calculated for the year 2007. Patient characteristics included gender, average length of hospice service, and primary diagnoses. Hospice-related characteristics included number of admissions per year, average daily

census, net operating revenues, inpatient unit [IPU] operating costs and pharmacy costs.

Patient-related Characteristics

There were approximately equal numbers of male (50.6%) and female hospice patients (49.4%). Mean length of stay (LOS) for year 2007 was 73.6 days, while median length of stay was 20.8 days among these hospices. Average number of patients with non-cancer diagnosis (58.5%) was higher than those with cancer. Majority of patients referred to a hospice had a terminal diagnosis from cancer, heart diseases, lung diseases, stroke or coma and Dementia or Alzheimer's disease (Refer Table 1).

Hospice-related Characteristics

The average number of admissions for the five hospices was 627 patients for year 2007. Average daily census was 136 patients and total patient days averaged 51,350 days in these five hospices. Net operating revenues for the study hospices ranged from a minimum of \$500,000 to \$13.8 million per hospice. The major components of expenses identified in the hospices were annual physician salary costs, annual nursing salary costs, inpatient unit (IPU) operating costs, durable medical equipment (DME) costs, pharmacy costs and bereavement costs.

For year 2007, average annual physician salary in each hospice was calculated to be \$87,500. Around \$930,000 was the average nursing staff salary costs, while vast differences in bereavement costs per hospice was observed. Average bereavement costs ranged from \$4,500 to \$222,000 per hospice. Durable medical equipment (DME) costs

varied from \$170,000 to \$600,000 per hospice, while the inpatient unit (IPU) operating costs varied from \$700,000 to \$1.7 million per hospice (Refer Table 2).

A total of 59,174 prescription claims among the five hospices accounted for approximately \$1.85 million worth of medications. Annual drug expenditures for each hospice averaged \$371,750 and an average hospice medication cost per patient per day (PPPD) was \$11.12 (\$12.43 PPPD for home care and \$8.5 PPPD for nursing care) for year 2007. With the exclusion of outliers such as enoxaparin injections, average hospice medication cost was \$10.72 PPPD.

Table 1. Patient characteristics in five hospices of Ohio for year 2007

Patient Characteristics		N%
Gender		
	Male	50.6
	Female	49.4
Length of Service (LOS)		
	Mean LOS	73.6
	Median LOS	20.8
Primary Diagnoses		
Cancer		41.5
Non-Cancer		58.5
	Heart Diseases	10.2
	Liver Diseases	8.8
	Lung Diseases	7.2
	Kidney Diseases	5.4
	HIV/AIDS	0.2
	Stroke/Coma	3.3
	ALS	2.3
	Other Motorneuron	2.8
	Debility Unspecified	11.2
	Other	7

N% = percentage of frequency.

Table 2. Characteristics of five hospices in Ohio for year 2007

Characteristic	Mean	Range
Number of admissions	627 patients	461 to 1,059 patients
Daily census	136 patients	79 to 250 patients
Total patient days	51,350 days	28,743 to 91,355 days
Net operating revenues	\$7.5 million	\$500,000 to \$13.8 million
Physician salary	\$87,500	\$83,748 to \$263,000
Collective Nursing salary	\$930,000	\$867,723 to \$1.1 million
Bereavement costs	\$75,875	\$4,500 to \$222,000
DME costs	\$237,500	\$170,000 to \$600,000
IPU costs	\$980,000	\$700,000 to \$1.7million
Annual drug costs	\$371,750	\$67,580 to \$ 763,413

N= Sum of frequencies; DME= Durable Medical Equipment; IPU=Inpatient Unit

Objective 2. Compare patient- and hospice-related characteristics of the five Ohio hospices with 2007 NHPCO data.

Statistical reports obtained from the five hospices were compared to the annual reports of NHPCO for year 2007. An average for patient and hospice characteristics was computed (objective 1) and compared with NHPCO data. The characteristics that were compared included average length of hospice service (LOS), primary diagnoses, gender, average daily census, and total patient days.

The average daily census (136 patients) and total patient days (51,350 days) in five study hospices were, approximately, 1.5 times higher as compared to that of NHPCO data (90 patients and 31,300 days, respectively). Number of males (50.6%) and mean length of service (73.6 days) were slightly greater than those seen in the NHPCO data (46.1% and 67.4 days, respectively). Similar to NHPCO data (55.1%), number of patients with non-cancer diagnosis (58.5%) was found to be higher than those with cancer in these hospices.

Table 3. Comparison of Ohio hospice data to NHPCO data.

Characteristics	Ohio hospice data	NHPCO data
Average. daily census	136 patients	90 patients
Total patient days	51,350 days	31,300 days
Gender		
Males	50.60%	46.10%
Females	49.40%	53.90%
LOS	73.6 days	67.4 days
Primary diagnoses		
Cancer	41.50%	44.90%
Non-cancer	58.50%	55.10%

LOS = Length of stay

Objective 3: To identify ten therapeutic drug classes with most frequent utilization rates and largest percentage of expenditure in hospice care and analyze five most frequently utilized therapeutic classes.

A) For combined dataset

Ten therapeutic drug classes with most frequent utilization rates and largest percentage of expenditure in hospice care

Approximately 1,020 different drugs under 246 therapeutic classes were utilized in the five hospices. Descriptive analyses for therapeutic class sorted by Rx Count were conducted to find the frequencies for prescription count for medications. The sum of prescription counts for medications under each therapeutic classes were calculated. Ten therapeutic classes with highest frequency of prescription count were reported. The most frequently utilized therapeutic class of drugs, based on prescription drug volume (Rx Count) included analgesic-narcotics (16.3%) followed by laxatives-cathartics (7.9%), and anti-anxiety drugs (7.2%), glucocorticoids (4.3%), selective serotonin reuptake inhibitors (SSRIs) (3.8%), loop diuretics (3.7%), gastric acid secretion reducers (3.4%), antipsychotics - dopamine antagonists, butyrophenones (2.6%), anti-convulsants (2.3%), and alpha-2-receptor antagonist depressants (1.9%). Out of 246 therapeutics classes, these ten therapeutic classes are most frequently utilized in Ohio hospices and account for over 50% of entire prescription volume for year 2007 (refer Table 4).

Table 4. Ten therapeutic classes sorted by prescription (Rx) count (combined dataset)

Therapeutic Class	Rx Count	Total Cost	Percentage %
ANALGESICS,NARCOTICS	9,776	\$315,926	16.35%
LAXATIVES AND CATHARTICS	4,730	\$43,730	7.91%
ANTI-ANXIETY DRUGS	4,312	\$86,690	7.21%
GLUCOCORTICOIDS	2,612	\$49,888	4.37%
SELECTIVE SEROTONIN REUPTAKE INHIBITOR (SSRIS)	2,305	\$89,497	3.86%
LOOP DIURETICS	2,260	\$14,522	3.78%
GASTRIC ACID SECRETION REDUCERS	2,040	\$69,039	3.41%
ANTIPSYCHOTICS,DOPAMINE ANTAGONISTS, BUTYROPHENONES	1,610	\$24,092	2.69%
ANTICONVULSANTS	1,354	\$67,226	2.26%
ALPHA-2 RECEPTOR ANTAGONIST ANTIDEPRESSANTS	1,172	\$38,033	1.96%
Grand Total	32,171	\$798,642	53.81%

Percentage (%) based on Total Rx Count..

Similar analyses for therapeutic classes sorted by total costs in descending order were conducted to find the costs that were contributed by each therapeutic class. Top ten therapeutic classes that contributed to majority of drug expenditures were reported. These included several most frequently utilized therapeutic classes such as analgesics-narcotics (17%), selective serotonin reuptake inhibitor-SSRIs (4.8%), and anti-anxiety drugs (4.6%), gastric acid secretion reducers (3.7%), anticonvulsants (3.6%), and glucocorticoids (2.7%). A few therapeutic classes that were not frequently utilized but contributed to majority of the expenses included anti-psychotics - dopamine antagonists (5.2%), beta adrenergic and anticholinergic combinations (3.3%), heparin and related preparations (3.2%), antiemetic/antivertigo (2.7%).

Table 5. Ten therapeutic classes sorted by total cost (combined dataset)

Therapeutic Class	Rx Count	Total Cost	Percentage %
ANALGESICS,NARCOTICS	9,776	\$315,926	17.00%
ANTIPSYCHOTICS,ATYPICAL,DOP AMINE,& SEROTONIN ANTAGONIST	802	\$96,023	5.17%
SELECTIVE SEROTONIN REUPTAKE INHIBITOR (SSRIS)	2,305	\$89,497	4.81%
ANTI-ANXIETY DRUGS	4,312	\$86,690	4.66%
GASTRIC ACID SECRETION REDUCERS	2,040	\$69,039	3.71%
ANTICONVULSANTS	1,354	\$67,226	3.62%
BETA-ADRENERGIC AND ANTICHOLINERGIC COMBINATIONS	468	\$61,087	3.29%
HEPARIN AND RELATED PREPARATIONS	99	\$58,533	3.15%
GLUCOCORTICOIDS	2,612	\$49,888	2.68%
ANTIEMETIC/ANTIVERTIGO AGENTS	698	\$49,250	2.65%
Grand Total	24,466	\$943,159	50.74%

Percentage (%) based on total costs.

Further, five most utilized therapeutic classes were analyzed to identify medications whose frequency of use contributed to majority of the expenses. Under therapeutic class analgesics-narcotics, medications such as morphine sulphate (31.7% - utilization, 25.2%- expenses), methadone (18.9% - utilization, but contributed to only 5.1% of entire analgesic-narcotics expenditure), oxycodone (11.4%, 20.3%), hydrocodone - acetaminophen (9%, 3.9%), and Eth- Oxydose (7%, 10.1%) were most frequently utilized and contributed to majority of expenditures. Fentanyl, whose frequency of use was only 5.9% of analgesic-narcotics class, contributed to 21.5% of expenditure.

Under therapeutic class laxatives-cathartics, the medications with most frequent utilization were senna S (34.9%), senna plus (11.4%), docusate sodium (10.4%), milk of magnesia (6.9%) and senna (5.9%). These five medications contributed to approximately 70% of laxatives-cathartics utilization in the hospices. Under anti-anxiety medication class, the medications that were most frequently utilized and contributed to majority of expenses included lorazepam (60.3%, 64.6%), alprazolam (29.8%, 15.8%), lorazepam intensol (6.3%, 14.1%), diazepam (2%, 1.5%), and busiprone (1%, 0.8%); these medications contributed to over 95% of utilization and expenditure of anti-anxiety class. Similarly, under SSRIs, the medications were sertraline (40.1%, 44.0%), citalopram (20.6%, 6.9%), paroxetine (17.2%, 19.7%), escitalopram (17%, 22%), and fluoxetine (3%, 3%). Under therapeutic class glucocorticoids, the medications contributing to most frequent utilization and expenditure were prednisone (67.9%, 18.1%), dexamethasone (22.7%, 26.4%), budesonide (3.5%, 38.1%), methylprednisolone (1, 8.1%), and

dexamethasone sodium phosphate (1, 0.4%). (Refer Tables 6, 7, 8, 9, 10, 11).

Table 6. Medications contributing to most frequent utilization and majority of expenditure under therapeutic class analgesics-narcotics.

Therapeutic Class	Drug Name	Rx Count	Total Cost	Percentage (%) Rx Count	Percentage (%) Total Cost
ANALGESICS, NARCOTICS	MORPHINE SULFATE	3,114	\$80,489	31.85%	25.48%
	OXYCODONE	1,133	\$67,893	11.59%	21.49%
	FENTANYL	548	\$64,664	5.61%	20.47%
	ETH-OXYDOSE	659	\$30,953	6.74%	9.80%
	METHADONE	1,941	\$17,074	19.85%	5.40%
ANALGESICS, NARCOTICS Total		9,776	\$315,926	16.35%	17.00%

Table 7. Medications contributing to most frequent utilization and majority of expenditure under therapeutic class laxatives-cathartics.

Therapeutic Class	Drug Name	Rx Count	Total Cost	Percentage (%) Rx Count	Percentage (%) Total Cost
LAXATIVES AND CATHARTICS	SENNAS	1,655	\$15,438	34.99%	35.30%
	SENNAS PLUS	538	\$5,983	11.37%	13.68%
	DOCUSATE SODIUM	492	\$2,890	10.40%	6.61%
	MILK OF MAGNESIA	326	\$2,159	6.89%	4.94%
	SENNAS	281	\$2,252	5.94%	5.15%
LAXATIVES AND CATHARTICS Total		4,730	\$43,730	7.91%	2.35%

Table 8. Medications contributing to most frequent utilization and majority of expenditure under therapeutic class anti-anxiety drugs.

Therapeutic Class	Drug Name	Rx Count	Total Cost	Percentage (%) Rx Count	Percentage (%) Total Cost
ANTI-ANXIETY DRUGS	LORAZEPAM	2,577	\$55,929	59.76%	64.52%
	ALPRAZOLAM	1,284	\$13,512	29.78%	15.59%
	LORAZEPAM INTENSOL	290	\$13,012	6.73%	15.01%
	DIAZEPAM	88	\$1,343	2.04%	1.55%
	BUSPIRONE HCL	39	\$761	0.90%	0.88%
ANTI-ANXIETY DRUGS Total		4,312	\$86,690	7.21%	4.66%

Table 9. Medications contributing to most frequent utilization and majority of expenditure under therapeutic class SSRIs.

Therapeutic Class	Drug Name	Rx Count	Total Cost	Percentage (%) Rx Count	Percentage (%) Total Cost
SELECTIVE SEROTONIN REUPTAKE INHIBITOR (SSRIS)	SERTRALINE	926	\$39,337	40.17%	43.95%
	CITALOPRAM	468	\$6,070	20.30%	6.78%
	PAROXETINE	411	\$18,014	17.83%	20.13%
	ESCITALOPRAM	382	\$19,781	16.57%	22.10%
	FLUOXETINE	69	\$2,557	2.99%	2.86%
(SSRIS) Total		2,305	\$89,497	3.86%	4.81%

Table 10. Medications contributing to most frequent utilization and majority of expenditure under therapeutic class glucocorticoids.

Therapeutic Class	Drug Name	Rx Count	Total Cost	Percentage (%) Rx Count	Percentage (%) Total Cost
GLUCOCORTICOIDS	PREDNISONE	1,804	\$9,321	69.07%	18.68%
	DEXAMETHASONE	620	\$14,356	23.74%	28.78%
	BUDESONIDE	90	\$18,859	3.45%	37.80%
	METHYLPREDNISOLONE	23	\$4,011	0.88%	8.04%
	METHYLPREDNISOLONE	14	\$458	0.54%	0.92%
GLUCOCORTICOIDS Total		2,612	\$49,888	4.37%	2.68%

Table 11. Medications contributing to most frequent utilization and majority of expenditure under therapeutic class antipsychotics, atypical, dopamine & serotonin antagonist.

Therapeutic Class	Drug Name	Rx Count	Total Cost	Percentage (%) Rx Count	Percentage (%) Total Cost
ANTIPSYCHOTICS, ATYPICAL, DOPAMINE & SEROTONIN ANTAGONIST	QUETIAPINE	380	\$38,780	47.38%	40.39%
	RISPERDAL	303	\$34,631	37.78%	36.07%
	ZYPREXA	81	\$16,208	10.10%	16.88%
	ZIPRASIDONE	25	\$2,431	3.12%	2.53%
	RISPERDAL CONSTA	7	\$2,411	0.87%	2.51%
ANTIPSYCHOTICS, ATYPICAL, DOPAMINE, & SEROTONIN ANTAG Total		802	\$96,023	1.34%	5.17%

Objective 3: To identify five therapeutic drug classes with most frequent utilization rates and largest percentage of expenditure in hospice care and analyze five most frequently utilized therapeutic classes.

B) For individual hospice dataset

Descriptive analyses were run using individual hospice data to identify five therapeutic classes and medications that were most frequently utilized and contributing to majority of expenditure within each hospice.

For Hospice 1

Approximately 236 medications categorized under 105 therapeutic classes were utilized in hospice 1.

Therapeutic drug classes with most frequent utilization rates and largest percentage of expenditure in hospice care.

For this objective, claims data for hospice 1 were utilized. Descriptive analysis were conducted to identify most utilized therapeutic classes revealed that analgesics-narcotics (22.3%), laxatives-cathartics (11.5%), anti-anxiety drugs (7.3%), glucocorticoids (4.9%), and loop diuretics (3.5%) were the five most utilized therapeutic drug classes in hospice 1. These results were found to be consistent with the results obtained using the combined dataset. When analyzed to identify therapeutic classes contributing to largest percentage of expenditure, analgesics-narcotics, anti-anxiety drugs, selective serotonin reuptake inhibitors (SSRIs), beta-adrenergic and glucocorticoid combination and anticonvulsants were found as drug classes contributing to majority of expenditure in hospice 1. (Refer Table 12 &13)

Table 12. Therapeutic classes most frequently utilized in hospice 1.

Therapeutic Class	Rx Count	Total Cost	Percentage (%)
ANALGESICS, NARCOTICS	554	\$17,747	22.32%
LAXATIVES AND CATHARTICS	286	\$2,579	11.52%
ANTI-ANXIETY DRUGS	182	\$5,089	7.33%
GLUCOCORTICOIDS	121	\$1,762	4.88%
LOOP DIURETICS	86	\$655	3.46%
Grand Total	1,229	\$27,832	49.52%

Percentage (%) based on Rx Count

Table 13. Therapeutic classes contributing to largest percentage of expenditure in hospice 1.

Therapeutic Class	Rx Count	Total Cost	Percentage (%)
ANALGESICS, NARCOTICS	554	\$17,747	26.26%
ANTI-ANXIETY DRUGS	182	\$5,089	7.53%
SELECTIVE SEROTONIN REUPTAKE INHIBITOR (SSRIS)	80	\$3,561	5.27%
BETA-ADRENERGIC AND GLUCOCORTICOID COMBINATIONS	13	\$3,231	4.78%
ANTICONVULSANTS	39	\$2,932	4.34%
Grand Total	868	\$32,560	48.18%

Percentage (%) based on Total Cost.

For Hospice 2

Therapeutic drug classes with most frequent utilization rates and largest percentage of expenditure in hospice care.

Descriptive analyses for calculating frequency of utilization for therapeutic classes and those contributing to largest percentage of expenditure were conducted using individual data for hospice 2. Most utilized therapeutic classes identified in hospice 2 were analgesics-narcotics (20%), anti-anxiety drugs (10.3%), laxatives-cathartics (8.2%), glucocorticoids (5%), and SSRIs (4.3%) were the five most utilized therapeutic drug classes in hospice 1. These results were found to be consistent with the results obtained using the combined dataset. Therapeutic classes contributing to largest percentage of expenditure were analgesics-narcotics (20.2%), anti-anxiety drugs (6.6%), selective serotonin reuptake inhibitors (SSRIs)(5.8%), anticonvulsants (5.1%) and beta-adrenergic and glucocorticoid combination (4.8%). These results were found to be similar to results from combined dataset and results of hospice 1. (Refer Tables 14 & 15)

Table 14. Therapeutic classes most frequently utilized in hospice 2.

Therapeutic Class	Rx Count	Total Cost	Percentage (%)
ANALGESICS,NARCOTICS	1,493	\$36,797	20.00%
ANTI-ANXIETY DRUGS	769	\$12,042	10.30%
LAXATIVES AND CATHARTICS	615	\$5,786	8.24%
GLUCOCORTICIDS	372	\$7,864	4.98%
SELECTIVE SEROTONIN REUPTAKE INHIBITOR (SSRIS)	318	\$10,512	4.26%
Grand Total	3,567	\$73,001	47.78%

Percentage (%) based on Rx Count.

Table 15. Therapeutic classes contributing to majority of expenditure in hospice 2.

Therapeutic Class	Rx Count	Total Cost	Percentage (%)
ANALGESICS,NARCOTICS	1,493	\$36,797	20.18%
ANTI-ANXIETY DRUGS	769	\$12,042	6.60%
SELECTIVE SEROTONIN REUPTAKE INHIBITOR (SSRIS)	318	\$10,512	5.77%
ANTICONVULSANTS	246	\$9,332	5.12%
BETA-ADRENERGIC AGENTS	146	\$8,392	4.60%
Grand Total	2,972	\$77,075	42.27%

Percentage (%) based on Total Cost.

For Hospice 3

Approximately 558 medications under 182 therapeutic classes were utilized in hospice 3.

Therapeutic drug classes with most frequent utilization rates and largest percentage of expenditure in hospice care.

Most utilized therapeutic classes identified in hospice 3 included analgesics-narcotics (15.6%), anti-anxiety drugs (5.7%), laxatives-cathartics (9.7%), glucocorticoids (4.4%), and gastric acid secretion reducers (4.4%) were the five most utilized therapeutic drug classes in hospice 1. These results were found to be consistent with the results obtained using the combined dataset. Therapeutic classes contributing to largest percentage of expenditure were analgesics-narcotics (16.6%), heparin and related preparations (6.6%), antipsychotics, atypical, dopamine, & serotonin antagonist (5.8%), gastric acid secretion reducers (4.4%), and antiemetics/antivertigo agents (4.2%). Unlike results from combined dataset, therapeutic classes such as heparin and related preparations and antiemetics/antivertigo agents contribute to a very large percentage of expenditure in hospice 3. (Refer Tables 16 & 17)

Table 16. Therapeutic classes most frequently utilized in hospice 3.

Therapeutic Class	Rx Count	Total Cost	Percentage (%)
ANALGESICS,NARCOTICS	2,181	\$76,044	15.51%
LAXATIVES AND CATHARTICS	1,338	\$11,827	9.52%
ANTI-ANXIETY DRUGS	798	\$18,509	5.68%
GLUCOCORTICOIDS	615	\$8,411	4.37%
GASTRIC ACID SECRETION REDUCERS	610	\$20,036	4.34%
Grand Total	5,542	\$134,826	39.41%

Percentage (%) based on Rx Count.

Table 17. Therapeutic classes contributing to majority of expenditure in hospice 3.

Therapeutic Class	Rx Count	Total Cost	Percentage (%)
ANALGESICS,NARCOTICS	2,181	\$76,044	16.36%
HEPARIN AND RELATED PREPARATIONS	58	\$30,252	6.51%
ANTIPSYCHOTICS,ATYPICAL,DOPAMINE,& SEROTONIN ANTAGONIST	292	\$26,361	5.67%
GASTRIC ACID SECRETION REDUCERS	610	\$20,036	4.31%
ANTIEMETIC/ANTIVERTIGO AGENTS	231	\$19,136	4.12%
Grand Total	3,372	\$171,829	36.96%

Percentage(%) based on Total Cost

For Hospice 4

Approximately 668 medications were utilized under 198 therapeutic drug classes.

Therapeutic drug classes with most frequent utilization rates and largest percentage of expenditure in hospice care.

Consistent with results obtained from the combined dataset, hospice 1, hospice 2 and hospice 3, therapeutic classes most frequently utilized and contributing to largest percentage of expenditure in hospice 4 were analgesics, narcotics (16.7%- utilization, 16.9%-expenditure), anti-anxiety drugs (7.6%, 4.2%), and SSRIs (3.7%, 5%) The classes that were most frequently utilized but did not contribute significantly to expenditure in hospice 4 included laxatives and cathartics (4.5%), and loop diuretics (4%). Therapeutic classes that contributed to majority of expenditure in hospice 4, but were not the most frequently utilized ones included antipsychotics, atypical, dopamine & serotonin antagonists (5.7%), and beta adrenergic and glucocorticoid combinations (4.2%). (Table 18 & 19)

Table 18. Therapeutic classes most frequently utilized in hospice 4.

Therapeutic Class	Rx Count	Total Cost	Percentage (%)
ANALGESICS,NARCOTICS	3,437	\$124,290	16.24%
ANTI-ANXIETY DRUGS	1,573	\$30,620	7.43%
LAXATIVES AND CATHARTICS	932	\$10,150	4.40%
LOOP DIURETICS	820	\$6,876	3.87%
SELECTIVE SEROTONIN REUPTAKE INHIBITOR (SSRIS)	765	\$37,058	3.61%
Grand Total	7,527	\$208,995	35.57%

Percentage (%) based on Rx Count.

Table 19. Therapeutic classes contributing to majority of expenditure in hospice 4.

Therapeutic Class	Rx Count	Total Cost	Percentage (%)
ANALGESICS,NARCOTICS	3,437	\$124,290	16.28%
ANTIPSYCHOTICS,ATYPICAL,DOPA MINE,& SEROTONIN ANTAG	289	\$41,933	5.49%
SELECTIVE SEROTONIN REUPTAKE INHIBITOR (SSRIS)	765	\$37,058	4.85%
BETA-ADRENERGIC AND ANTICHOLINERGIC COMBINATIONS	183	\$31,117	4.08%
ANTI-ANXIETY DRUGS	1,573	\$30,620	4.01%
Grand Total	6,247	\$265,018	34.71%

Percentage (%) based on Total Cost.

For Hospice 5

Approximately 478 drugs under 168 therapeutic drug classes were utilized in hospice 5.

Therapeutic drug classes with most frequent utilization rates and largest percentage of expenditure in hospice care.

Drug classes that were highly utilized included analgesics, narcotics (14.5%), laxatives-cathartics (10.7%), anti-anxiety drugs (7%), glucocorticoids (5.2%), and loop diuretics (4.3%). These results were almost similar to results obtained earlier from other hospice data. Therapeutic classes accounting for majority of expenditure were analgesics, narcotics (16%), heparin and related preparations (6.1%), anti-anxiety drugs (5.4%), SSRIs (5.2%), and antipsychotics, atypical dopamine, serotonin antagonists (5.1%). (Refer Tables 20 & 21)

Table 20. Therapeutic classes most frequently utilized in hospice 5.

Therapeutic Class	Rx Count	Total Cost	Percentage (%)
ANALGESICS,NARCOTICS	2,111	\$61,049	14.45%
LAXATIVES AND CATHARTICS	1,559	\$13,387	10.67%
ANTI-ANXIETY DRUGS	990	\$20,430	6.78%
GLUCOCORTICIDS	759	\$16,130	5.19%
LOOP DIURETICS	631	\$3,203	4.32%
Grand Total	6,050	\$114,199	41.40%

Percentage (%) based on Rx Count.

Table 21. Therapeutic classes contributing to majority of expenditure in hospice 5.

Therapeutic Class	Rx Count	Total Cost	Percentage (%)
ANALGESICS,NARCOTICS	2,111	\$61,049	16.04%
HEPARIN AND RELATED PREPARATIONS	30	\$23,110	6.07%
ANTI-ANXIETY DRUGS	990	\$20,430	5.37%
SELECTIVE SEROTONIN REUPTAKE INHIBITOR (SSRIS)	609	\$19,864	5.22%
ANTIPSYCHOTICS,ATYPICAL,DOPAMINE,& SEROTONIN ANTAGONIST	136	\$19,443	5.11%
Grand Total	3,876	\$143,895	37.81%

Percentage (%) based on Total Cost.

Objective 4: To identify ten medications with most frequent utilization rates and largest percentage of expenditure in hospice care.

A) For Combined Dataset

Ten medications with most frequent utilization rates and largest percentage of expenditure in hospice care.

Medications whose frequency of use accounted for high utilization as well as expense included morphine sulfate (5.2% - utilization, 4.3% - expenditure) and lorazepam (4.4%, 3.0 %), while medications such as furosemide (4%, 0.6%), methadone (3.25%, 0.9%), and prednisone (3.0%, 0.5%) contributed highly to utilization, but were not a significant contributor to expenditure. There were certain medications such as enoxaparin injections whose frequency of utilization was low (0.01%), but contributed to 3.1% of total medication expenditure. Likewise, fentanyl and oxycodone contributed to 3.5% and 3.7%, respectively to the total medication expenditure, but their frequency of utilization was very low, only 0.9% and 1.9%, respectively (Refer Tables 22 and 23).

The listed 10 medications (Table 22) were the most significant contributors to utilization. They accounted for 31% of entire medication utilization in the hospices. Table 23 lists the top 10 medications contributing significantly to expenditures. Out of the 1,020 medications, the listed medications contributed to about 27.5% of total expenditure.

Table 22. Ten medications sorted by prescription (Rx) count (combined dataset)

Drug Name	Rx Count	Total Cost	Percentage %
MORPHINE SULFATE	3,114	\$80,489	5.21%
LORAZEPAM	2,606	\$56,552	4.36%
FUROSEMIDE	2,148	\$10,949	3.59%
METHADONE	1,941	\$17,074	3.25%
PREDNISONE	1,804	\$9,321	3.02%
SENNAS	1,655	\$15,438	2.77%
HALOPERIDOL	1,466	\$21,225	2.45%
ALPRAZOLAM	1,284	\$13,512	2.15%
MIRTAZAPINE	1,171	\$38,026	1.96%
OXYCODONE HCL	1,133	\$67,893	1.90%
Grand Total	18,322	\$330,481	30.65%

Percentage (%) based on total Rx Count.

Table 23. Ten medications sorted by total costs. (Combined dataset)

Drug Name	Rx Count	Total Cost	Percentage %
MORPHINE SULFATE	3,114	\$80,489	4.33%
OXYCODONE	1,133	\$67,893	3.65%
FENTANYL	548	\$64,664	3.48%
LORAZEPAM	2,606	\$56,552	3.04%
ENOXAPARIN INJECTIONS	63	\$56,511	3.04%
SERTRALINE	926	\$39,337	2.12%
QUETIAPINE	380	\$38,780	2.09%
MIRTAZAPINE	1,171	\$38,026	2.05%
RISPERDAL	303	\$34,631	1.86%
OXYCODONE	659	\$30,953	1.67%
Grand Total	10,903	\$507,836	27.32%

% percentage based on total Cost.

Objective 4: To identify ten medications with most frequent utilization rates and largest percentage of expenditure in hospice care.

B) For individual hospice dataset

Descriptive analyses were run using individual hospice data to identify five therapeutic classes and medications that were most frequently utilized and contributing to majority of expenditure within each hospice

For Hospice 1

Medications with most frequent utilization rates and largest percentage of expenditure in hospice care.

Medications that were most frequently utilized and contributed to largest percentage of expenditure in hospice 1 included methadone (7.6%-utilization, 2.8%-expenditure), morphine sulfate (7.2%, 7%), lorazepam (3.4%, 3.7%), and oxycodone (3.1%, 10%). Furosemide (3.1%) was also found to be frequently utilized, but contributed to only about 0.6% of expenditure; while fluticasone propionate (4.8%) contributed to a large percentage of expenditure. (Refer Tables 24 & 25)

These listed medications in tables 24 & 25 alone contributed to 27.5% of utilization & 25% of total medication expenditure in hospice 1.

Table 24. Medications most frequently utilized in hospice 1.

Drug Name	Rx Count	Total Cost	Percentage (%)
METHADONE	189	\$1,873	7.61%
MORPHINE SULFATE	179	\$4,737	7.21%
LORAZEPAM	84	\$2,500	3.38%
FUROSEMIDE	78	\$393	3.14%
OXYCODONE	76	\$6,784	3.06%
Grand Total	682	\$16,762	27.48%

Percentage (%) based on Rx Count

Table 25. Medications contributing to majority of expenditure in hospice 1.

Drug Name	Rx Count	Total Cost	Percentage (%)
OXYCODONE	76	\$6,784	10.04%
MORPHINE SULFATE	179	\$4,737	7.01%
FLUTICASONE PROPIONATE	13	\$3,231	4.78%
LORAZEPAM	84	\$2,500	3.70%
METHADONE	189	\$1,873	2.77%
Grand Total	541	\$19,126	28.30%

Percentage (%) based on Total Cost.

For Hospice 2

Medications with most frequent utilization rates and largest percentage of expenditure in hospice care.

Medications, whose frequency of use contributed to majority of expenditure in hospice 2 included lorazepam (9.1%-utilization, 5.9%-expenditure) and morphine sulphate (8.9%, 6.4%). Other medications most frequently utilized included senna S (4%), prednisone (3.3%), haloperidol (2.9%); and medications that contributed to majority of expenditure included fentanyl (5.9%), oxycodone (2.8%) and sertraline (2.8%). (Refer Tables 26 & 27).

Table 26. Medications most frequently utilized in hospice 2.

Drug Name	Rx Count	Total Cost	Percentage (%)
LORAZEPAM	681	\$10,763	9.12%
MORPHINE SULFATE	663	\$11,742	8.88%
SENNAS	301	\$2,611	4.03%
PREDNISONE	250	\$1,179	3.35%
HALOPERIDOL	213	\$2,781	2.85%
Grand Total	2,108	\$29,076	28.24%

Percentage (%) based on Rx Count.

Table 27. Medications contributing to majority of expenditures in hospice 2.

Drug Name	Rx Count	Total Cost	Percentage (%)
MORPHINE SULFATE	663	\$11,742	6.44%
FENTANYL	89	\$10,777	5.91%
LORAZEPAM	681	\$10,763	5.90%
OXYCODONE	136	\$5,060	2.77%
SERTRALINE	155	\$5,052	2.77%
Grand Total	1,724	\$43,393	23.80%

Percentage (%) based on Total Cost.

For Hospice 3

Medications with most frequent utilization rates and largest percentage of expenditure in hospice care.

Morphine sulphate was most frequently utilized and contributed to significant expenditure. Medications that were highly utilized in hospice 3 included furosemide (3.9%), lorazepam (3.8%), senna S (3.1%), and methadone HCl (2.6%). Medications that accounted to large expenditures included enoxaparin injections (6.5%), fentanyl (5.5%), risperdal (2.9%), and oxycodone (2.8%). (Refer Tables 28 & 29)

Table 28. Medications most frequently utilized in hospice 3.

Drug Name	Rx Count	Total Cost	Percentage (%)
MORPHINE SULFATE	813	\$21,981	5.78%
FUROSEMIDE	541	\$2,644	3.85%
LORAZEPAM	537	\$10,328	3.82%
SENNAS	434	\$3,878	3.09%
METHADONE	360	\$2,929	2.56%
Grand Total	2,685	\$41,760	19.10%

Percentage (%) based on Rx Count.

Table 29 . Medications contributing to majority of expenditure in hospice 3.

Drug Name	Rx Count	Total Cost	Percentage (%)
ENOXAPARIN INJECTIONS	28	\$29,889	6.43%
FENTANYL	228	\$24,962	5.37%
MORPHINE SULFATE	813	\$21,981	4.73%
RISPERDAL	117	\$13,420	2.89%
OXYCODONE	225	\$12,939	2.78%
Grand Total	1,411	\$103,191	22.20%

Percentage (%) based on Total Cost.

For Hospice 4

Medications with most frequent utilization rates and largest percentage of expenditure in hospice care.

Morphine sulphate was the most utilized medication (4.8%) that contributed to the largest percentage of expenditure (4.1%) in hospice 4; while lorazepam contributed to 2.5% of expenditures with 3.4% of utilization rate. Other most utilized medications were alprazolam (3.7%), furosemide (3.6%), and methadone (3.3%); and medications with largest percentage of expenditure included fentanyl (3.2%), oxycodone (3%), sertraline HCl (2.4%). (Refer tables 30 & 31)

Table 30. Medications most frequently utilized in hospice 4.

Drug Name	Rx Count	Total Cost	Percentage (%)
MORPHINE SULFATE	990	\$29,795	4.68%
ALPRAZOLAM	760	\$8,131	3.59%
FUROSEMIDE	745	\$4,042	3.52%
LORAZEPAM	693	\$18,040	3.27%
METHADONE	674	\$6,973	3.18%
Grand Total	3,862	\$66,981	18.25%

Percentage (%) based on Rx Count.

Table 31. Medications contributing to majority of expenditures in hospice 4.

Drug Name	Rx Count	Total Cost	Percentage (%)
MORPHINE SULFATE	990	\$29,795	3.90%
FENTANYL	172	\$23,687	3.10%
OXYCODONE	262	\$22,073	2.89%
LORAZEPAM	693	\$18,040	2.36%
SERTRALINE	351	\$17,586	2.30%
Grand Total	3,025	\$140,336	18.38%

Percentage (%) based on Total Cost.

For Hospice 5

Medications with most frequent utilization rates and largest percentage of expenditure in hospice care.

Lorazepam was the medication whose frequency of use contributed to majority of expenditure (4.2%-utilization, 3.9%-expenditure). Senna S (5%), furosemide (4.3%), prednisone (3.9%), and methadone (3.7%) were the medications that were most frequently utilized in hospice 5. Medications that contributed to largest percentage of expenditure included oxycodone (6%), enoxaparin injections (5.7%), mirtazapine (3%), morphine sulphate (3.2%). (Refer Tables 32 & 33)

Table 32. Medications most frequently utilized in hospice 5.

Drug Name	Rx Count	Total Cost	Percentage (%)
SENNAS	723	\$5,943	4.95%
FUROSEMIDE	630	\$3,171	4.31%
LORAZEPAM	611	\$14,921	4.18%
PREDNISONE	564	\$2,868	3.86%
METHADONE	546	\$4,055	3.74%
Grand Total	3,074	\$30,958	21.04%

Percentage (%) based on Rx Count.

Table 33. Medications contributing to majority of expenditures in hospice 5.

Drug Name	Rx Count	Total Cost	Percentage (%)
OXYCODONE	462	\$22,967	6.04%
ENOXAPARIN INJECTIONS	29	\$21,569	5.67%
LORAZEPAM	611	\$14,921	3.92%
MORPHINE SULFATE	469	\$12,235	3.22%
MIRTAZAPINE	373	\$11,231	2.95%
Grand Total	1,944	\$82,923	21.79%

Percentage (%) based on Total Cost.

Finally, analyses were conducted to find percentage of therapeutic class and medication utilization by each hospice. Descriptive analysis suggested that analgesics-narcotics was most frequently utilized by hospice 4 (35.2% of the overall analgesic-narcotic utilization by all five hospices), followed by hospice 3 (22.3%) and hospice 5 (21.6%). Therapeutic class laxatives-cathartics was most frequently utilized by hospice 5 (33%), hospice 3 (28.3%), and by hospice 4 (19.7%); while anti-anxiety drugs were highly utilized by hospice 4 (36.5%), hospice 5 (23%), hospice 3 (18.5%) and hospice 2 (17.2%). Glucocorticoids were found to be utilized most frequently in hospice 5 (29.1%), hospice 4 (28.5%) and hospice 3 (27.5%). Hospice 4 (33.2%, 36.3%, 38.7%, 34.5%), followed by hospice 5 (26.4%, 27.9%, 27.1%, 31.8%) and hospice 3 (23.1%, 25.2%, 16.2%, 19.6%) were found to most frequently utilize therapeutic classes such as SSRIs, loop diuretics, antipsychotics - dopamine antagonists - butyrophenones, and alpha-2 receptor antagonist antidepressants, respectively. Gastric acid secretion reducers were most frequently utilized by hospice 3, followed hospice 5 and hospice 4. Anticonvulsants were frequently utilized by hospice 4, hospice 3 and hospice 5. (Refer Table 34-A)

For medication utilization, hospice 5 utilized majority of oxycodone (40.8%). Hospice 4 had the highest frequency of utilization for morphine sulphate (31.8%), methadone HCl (34.7%), alprazolam (59.19%), haloperidol (40.65%), methadone (34.72%), and mirtazapine (34.5%). (Refer Table 34-B)

Table 34-A. Therapeutic class utilization by Ohio hospices

	Hospice 1		Hospice 2		Hospice 3		Hospice 4		Hospice 5		
Therapeutic Class	Rx Count	(%)	Rx Count	(%)	Rx Count	(%)	Rx Count	(%)	Rx Count	(%)	Total
ANALGESICS, NARCOTICS	554	5.67%	1,493	15.27%	2,181	22.31%	3,437	35.16%	2,111	21.59%	9,776
LAXATIVES AND CATHARTICS	286	6.05%	615	13.00%	1,338	28.29%	932	19.70%	1,559	32.96%	4,730
ANTI-ANXIETY DRUGS	182	4.22%	769	17.83%	798	18.51%	1,573	36.48%	990	22.96%	4,312
GLUCOCORTICOIDS	121	4.63%	372	14.24%	615	23.55%	745	28.52%	759	29.06%	2,612
SELECTIVE SEROTONIN REUPTAKE INHIBITOR (SSRIS)	80	3.47%	318	13.80%	533	23.12%	765	33.19%	609	26.42%	2,305
LOOP DIURETICS	86	3.81%	154	6.81%	569	25.18%	820	36.28%	631	27.92%	2,260
GASTRIC ACID SECRETION REDUCERS	48	2.35%	251	12.30%	610	29.90%	551	27.01%	580	28.43%	2,040
ANTIPSYCHOTICS,DOPAMINE ANTAGONISTS,BUTYROPHENO NES	71	4.41%	219	13.60%	261	16.21%	623	38.70%	436	27.08%	1,610
ANTICONVULSANTS	39	2.88%	246	18.17%	319	23.56%	472	34.86%	278	20.53%	1,354
ALPHA-2 RECEPTOR ANTAGONIST	29	2.47%	136	11.60%	230	19.62%	404	34.47%	373	31.83%	1,172
ANTIDEPRESSANTS											
Grand Total	1,496	4.65%	4,573	14.21%	7,454	23.17%	10,322	32.08%	8,326	25.88%	32,171

Percentage (%) based on Rx Count.

Table 34-B. Therapeutic class utilization by Ohio hospices

	Hospice 1		Hospice 2		Hospice 3		Hospice 4		Hospice 5		
Therapeutic Class	Rx Count	(%)	Rx Count	(%)	Rx Count	(%)	Rx Count	(%)	Rx Count	(%)	Total
MORPHINE SULFATE	179	5.75%	663	21.29%	813	26.11%	990	31.79%	469	15.06%	3,114
LORAZEPAM	84	3.22%	681	26.13%	537	20.61%	693	26.59%	611	23.45%	2,606
FUROSEMIDE	78	3.63%	154	7.17%	541	25.19%	745	34.68%	630	29.33%	2,148
METHADONE	189	9.74%	172	8.86%	360	18.55%	674	34.72%	546	28.13%	1,941
PREDNISONE	71	3.94%	250	13.86%	356	19.73%	563	31.21%	564	31.26%	1,804
SENNA S	17	1.03%	301	18.19%	434	26.22%	180	10.88%	723	43.69%	1,655
HALOPERIDOL	54	3.68%	213	14.53%	233	15.89%	596	40.65%	370	25.24%	1,466
ALPRAZOLAM	49	3.82%	69	5.37%	82	6.39%	760	59.19%	324	25.23%	1,284
MIRTAZAPINE	29	2.48%	135	11.53%	230	19.64%	404	34.50%	373	31.85%	1,171
OXYCODONE	76	6.71%	108	9.53%	225	19.86%	262	23.12%	462	40.78%	1,133
Grand Total	826	4.51%	2,746	14.99%	3,811	20.80%	5,867	32.02%	5,072	27.68%	18,322

Percentage (%) based on Rx Count.

Further, the PPPD medication costs of study hospices were compared with nationwide hospices for benchmarking purposes. The PPPD medication costs for nationwide hospices were found from Milliman study(1998) and PoPCRN study(2001) (Refer Table 36). The costs from these studies were inflated to year 2007 costs for appropriate comparison. For inflating the costs from earlier years, medical cost inflation rate from year 1998 -2007 were obtained from United States Bureau of Labor Statistics. A cumulative inflation rate for these years was computed, which was found to be 42.3% (Refer Table 35). The 1998 and 2001 year costs were inflated to 2007 year costs using the following formula:

$$\sum \text{Inflation Rate} = (P_0 - P_{-1}) / P_{-1} * 100$$

where;

P_0 = Price/Cost of goods in present year;

P_{-1} = Price/Cost of goods in the earlier year;

\sum Inflation Rate = Cumulative inflation rate.

For calculating the average PPPD medication costs in study hospices, total costs for medications per day was divided by number of patients. It was found that certain medications such as enoxaparin acted as outliers, whose utilization was minimal, but contributed to over 3% of total medication expenditures. Such outliers were excluded in the calculation of PPPD. On comparing these inflated costs to the costs from study hospices, it was found that costs of PPPD medication cost (\$10.72 – with the exclusion of outlier) in study hospices was significantly lower than inflated PPPD medication costs of Milliman study (\$22.1) and PoPCRN study (\$14.7) (Refer Table 35).

Table 35. Medical cost inflation rates. Source: U.S. Bureau of Labor Statistics.

Year	Medical Cost Inflation Rate	Cumulative Medical Cost Inflation Rate
1998	3.20%	3.20%
1999	3.50%	6.70%
2000	4.10%	10.80%
2001	4.60%	15.40%
2002	4.70%	20.10%
2003	4.00%	24.10%
2004	4.80%	28.50%
2005	4.40%	32.70%
2006	4.20%	36.70%
2007	4.80%	42.30%
1998-2007		42.30%

Table 36. Comparison of medication costs (PPPD)

	Milliman Study	PoPCRN Study	Study Hospices
Original Year	1998	2001	2007
PPPD for Original Years	\$15.72	\$11.47	\$10.72
Inflated Costs to Year 2007	\$22.10	\$14.37	\$10.72

PPPD=Per Patient Per Day cost; PoPCRN=The Population-based Palliative Care Research Network.

CHAPTER 5

DISCUSSION AND CONCLUSIONS

This chapter discusses the findings of this study, draws conclusions, presents implications, and provides limitations of the study.

This study is an exploratory study and a part of the study analyzed the patient and hospice related characteristics of the study hospices and compared it with nationwide hospices using 2007 NHPCO data. The primary focus of this study was to analyze the medication costs and utilization in hospice care, for which PBM claims data for year 2007 were utilized. It was observed that pharmacy cost is a major component of total costs of hospice care. Therefore, the study identified some key elements (therapeutic classes and medications) contributing to significant medication costs produced by hospice care.

An analysis of reports provided by the five study hospices found that average number of admissions for the study hospices combined was 627 patients for year 2007. The average daily census (136 patients) and total patient days (51,350 days) in these five hospices were 1.5 times higher as compared to that of NHPCO data (90 patients and 31,300 days, respectively). This implies that study hospices were relatively larger sized hospices. It was also observed that there was equal number of male and female admissions in 2007; comparing with nationwide hospices using NHPCO data, the number of male admissions was found to be higher. Similar to NHPCO data (55.1%), number of

patients with non-cancer diagnosis (58.5%) was higher than those with cancer in these hospices.

Some variables that were analyzed from reports provided by study hospices included, but not compared with NHPCO data were net operating revenues, physician, nursing salary, bereavement costs, DME costs and inpatient unit costs. Net operating revenues of the Ohio hospices ranged from a minimum of \$500,000/ hospice to \$13.8 million/ hospice. The difference in net operating revenues (NOR) was very high, suggesting a possibility that a few hospices were run on a smaller scale as compared to other hospices, where the NOR were in millions. Four out of five hospices had inpatient units and the inpatient unit (IPU) operating costs varied from \$700,000/ hospice to \$1.7 million/ hospice. Average physician salary was lower than average nursing salary because these salaries reflect on the total expenditures made by the hospice on physician salary and nursing salary. Hospice interdisciplinary team typically consists of one physician; but approximately 10 to 20 nurses, which justifies a higher proportion of expenditure on nursing salaries.

Approximately 1,020 different drugs under 246 therapeutic classes were utilized in the five hospices. The most frequently utilized therapeutic class of drugs, based on prescription drug volume included analgesic-narcotics (15.6%) followed by laxatives-cathartics (7.5%), and anti-anxiety drugs (7%). These results are self-explanatory as mentioned in Chapter 1, because hospice care is primarily focused on pain and symptom management, and in making the patient feel comfortable. When analyzing therapeutic

classes contributing to the majority of drug expenditures, it was found that these included analgesics-narcotics (16.5%), SSRIs (4.7%), and anti-anxiety drugs (4.5%). Since the utilization of analgesics, narcotics and anti-anxiety drugs is very high, the medication expenditure in these classes is also very high. However, laxatives-cathartics, which followed second for utilization was not observed as a major expenditure contributor. This may be because laxatives-cathartics are relatively inexpensive drugs. SSRIs were found to be the major contributor to expenditures. To explain this, further analyses for analyzing each highly utilized therapeutic classes were conducted.

Upon analyzing, analgesics-narcotics, it was observed that morphine sulfate and methadone were the two most frequently utilized medications [morphine (31.7% - utilization, 25.2% - expenditure), methadone (18.9%, 5.1%) and oxycodone (11.4%, 20.3%)]. Fentanyl contributed to 22% of analgesic-narcotic expenditure; however, its utilization was only 5.6%. Methadone is very frequently utilized; however the percentage of expenditure it contributes to total analgesics-narcotics is very low. Such cost-effective medications should be highly recommended for utilization. Under laxatives-cathartics, the most frequently utilized medications included senna, docusate sodium, senna S. These medications have very low prices, hence, laxatives-cathartics are not found as a major contributor to expenditures. However, for therapeutic class SSRI, medications that contributed to major utilization as well as high expenditure rates included sertraline (40.1% utilization, 44% expenditure), citalopram (20.6%, 6.9%), paroxetine (17.2%, 19.7%), and escitalopram (17%, 22%). Sertraline and escitalopram are expensive medications contributing to major expenditure to the hospices.

Medications whose frequency of use accounted for high expense included morphine sulfate (5.3% - utilization, 4.4% - expenditure), lorazepam (4.4%, 3.1%), furosemide (4%, 0.6%), methadone (3%, 0.9%), and prednisone (3.1%, 0.5%). These medications fall under the highly utilized therapeutic classes. They explain the most frequent utilization of the therapeutic classes. Furthermore, medications such as Enoxaparin injections whose frequency of utilization was low (0.01%), contributed to 3.1% of total medication expenditure. Likewise, fentanyl and oxycodone contributed to 3.5% and 3.7%, respectively to the total medication expenditure, but their frequency of utilization was only 0.9% and 1.9%, respectively. Such medications that do not prove to be cost-effective, should be reviewed by pharmacists and their utilization should be minimized.

Furthermore, medications whose frequency of use accounted for high expense were analyzed within the identified therapeutic classes. For therapeutic class analgesic-narcotics, medications whose frequency of use contributed to major expenses were morphine (31.7% - utilization, 25.2% - expenditure), methadone (18.9%, 5.1%) and oxycodone (11.4%, 20.3%). Fentanyl contributed to 22% of analgesic-narcotic expenditure, however, its utilization was only 5.6%. Medications under therapeutic class laxatives & cathartics included senna (36.7% of expense), senna plus (11.4%) and docusate sodium (9.5%). Similarly, medications for treatment of anxiety, which contributed to approximately 90% of expenses, were lorazepam (60.2% - utilization, 64.2% - expenditure), alprazolam (29.8%, 15.8%), and lorazepam intensol (6.3%, 14.1%).

Overall, comparing the medication PPPD costs of study hospice with nationwide hospices, it was found that costs for medications at study hospices were low. This result could be attributed to the fact that the study hospices employ pharmacists for medication review. Hence, the utilization of cost-effective medications such as methadone and citalopram is high, while utilization of costly agents such as fentanyl, oxycodone and enoxaparin injections is low.

CONCLUSION OF THE STUDY

Health expenditures in the United States neared \$2.3 trillion in 2007, over ten times the \$256 billion spent in 1980. ⁶⁶ Prescription drugs have been the fastest-growing component of health care costs. In 2007, prescription drug expenditures grew to \$236 billion, which is over twenty times of \$12 billion expenditures in 1980s ⁶⁶

Prescription drug costs are rising because of the availability of more expensive and new drugs (accounting for 38% of the cost increase), greater overall utilization of prescription drugs (44%), and drug price inflation (18%).⁴ The increase is further fueled by the aging of the baby boom generation, the largest U.S. population cohort, that are beginning to suffer the chronic illnesses of old age. Additionally, many drug manufacturers use direct-to-consumer advertising to stimulate demand for new and more expensive drug products. With the advent of newer drugs every year and the pharmaceutical world now stepping into the very expensive, specialty drugs, the need for

research to evaluate cost-effective medications has become imperative. It has become necessary to find and employ new interventions to control the costs of such products. These high costs prove to be burdensome on patients, and the society, as a whole, and essential steps should be taken to lever such situation.

This study suggests that pharmacists led interventions are a useful way to lower the costs and recommend cost-effective medications for patients. Pharmacists are an important link to physician/patient relationship. The present study aimed at identifying medications and therapeutic classes that contributed to majority of the expenditure and utilization in hospices that utilize clinical pharmacists for drug utilization review. It was found the pppd costs in the study hospices were lower than pppd costs for hospices nationally. This proves the fact that pharmacist led interventions such as medication review has the potential to bring cost savings.

In this study, the five study hospices employ preferred drugs recommended by pharmacists following a medication review to identify potential drug related problems (DRPs) and encourage cost-effective drug utilization. As a result of these interventions, the utilization of medications such as fentanyl patches, enoxaparin injections and oxycodone is low. Use of medications such as methadone, alprazolam, prednisone, citalopram should be recommended.

The overall costs for hospice care to Medicare, other third party payers and patients may be less as compared to the costs incurred by conventional care, but the most

important element to hospice care, the cost for medications (8% - 40% of net operating revenues) still holds opportunity to be minimized. Especially, with the introduction of Patient Protection plan (2010) and ACA, and the new hospice payment rules, phase-out of Budget Neutrality Adjustment Factor (BNAF) will be implemented, leading to a reduction in market basket update. Due to this, it has been estimated that median Medicare profit margin for the hospice industry could decrease from 4% in 2008 to -11% by 2019. This could severely affect hospices that serve rural patients, leading to an overall negative profit margin in 66% of hospices by 2019. This will result to tremendous difficulty in operation of hospice care. Therefore, hospice care needs to discover every opportunity to strategize the reduction in costs incurring in serving the patients.⁶⁷

Pharmacists specializing in hospice and palliative care are able to recommend appropriate and effective drug therapy as an alternative to high cost, high risk medications and produce cost-savings; also identify DRPs which have the potential to influence better patient outcomes. Hospices throughout the nation should consider putting into effect such interventions made by pharmacists and place emphasis on the utilization of cost effective drugs that can be used among terminally ill patients to provide a high level of quality care with fiscal responsibility.

PBMs are a very important link between the pharmaceutical manufacturers, suppliers and the institutions providing health care services. On the basis of drug utilization research (DUR) and cost-effectiveness research, PBMs are able to make changes to the drug formulary. They help in providing patients and the institutions such

as hospices with appropriate medications-the foundation for selection of medications being medication review by pharmacists. Thus, assisting hospices in achieving cost savings, along with a high quality of clinical effectiveness.

IMPLICATIONS OF THE STUDY

This study is important for 2 main reasons: this study provides information on cost savings produced by pharmacist-led interventions such as medication review in hospice care; and analyzes all the important medications utilized in hospice care. There is a dearth in literature regarding information on medications costs and utilization in hospice care. This study will demonstrate as a benchmark for nationwide hospices for information on medications used in hospice care.

LIMITATIONS OF THE STUDY

The study has some potential limitations. Firstly, the inherent limitations of a retrospective database are applicable to this study as well. Retrospective databases are often questioned in terms of validity because of possible issues with misclassification bias, selection bias, confounding factors, sponsorship, data quality, and privacy. Secondly, the claims data have their own limitations for conducting the study. Claims data are also questioned since they don't provide enough of the information researchers need to develop and improve evidence-based guidelines. Furthermore, literature suggests that bias promoted by the insurance industry by encouraging and supporting the adage "less is

more" may make claim's data unreliable.

Based on the nature of the data available, only exploratory and descriptive type of research designs were used in the study. Patient-level claims data would have been ideal to research further into demographic factors affecting or driving the medication costs at hospice care. Furthermore, data for only five hospices were analyzed, making it difficult to generalize the results to an entire population.

For comparison of medication costs, previous published data from studies have been utilized to give an overall idea for the cost savings produced pharmacist led interventions, assuming that all hospices that participated in previous published studies, were a mix of hospices that employ pharmacists led intervention and those that do not employ pharmacist led interventions. The results would prove more appropriate and robust, if PBM claims data for hospices that do not use pharmacists interventions were utilized to compare with our study hospices that employ pharmacist's interventions.

In this study, reports provided by hospices have been utilized as resource to understand hospice and patient related characteristics. Hence, robust statistical analyses were not conducted. From, statistical point of view, analysis such as regression and power analysis can be conducted to find the relationship between medication utilization and patient/hospice-related variables. Results show that length of service (LOS) at hospice care is highly skewed, to further study the LOS and the factors that affect LOS, survival analysis would be very beneficial.

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RESEARCH INTERESTS

Market research using data, Secondary databases, Health economics and pharmacoeconomic evaluations, and Health outcomes research.

PROFESSIONAL EDUCATION

2013 Master of Pharmacy Administration (*Degree to be awarded in May 2013*)
Dept. of Pharmacy Administration, Duquesne University, Pittsburgh, PA.

2005 Bachelor of Pharmacy (*B. Pharm*)
Modern College of Pharmacy, Pune University – Pune, India.

WORK EXPERIENCE

Feb 2009 – Feb 2010 Healthcore Inc., Wilmington, DE.

Job Profile: Health Economics & Outcomes Research Analyst

- Performing prospective and retrospective health economic research activities.
- Conducting statistical analysis for research projects using SAS.
- Supporting research activities for Health Outcomes project managers in research designs, and analytical techniques.

June 2008 – Sept 2008 Novartis Pharmaceuticals, New Jersey, USA.

Job Profile: Outcomes Research Intern

- Assisted in project development related to diseases such as hypertension and diabetes using database and interpreted results.
- Assisted in project development related to cigarette smoking using database, conducted analysis and interpreted results. (Results to be presented at a conference)
- Conducted review on Health Related Quality of life (HRQoL) instruments used in patients with cognitive dementia and hypertension

Oct 2004 – Nov 2004 Internship at Baroque Pharmaceuticals, Gujarat, India.

- Undergone training in chemical and instrumental analysis of raw materials, finished products, and manufacturing departments of tablet, capsule and liquid dosage forms.

PUBLICATIONS

1. Parekh R, Rane P, Kamal KM. Pill Box: Enhancing physician pharmacist communication: A step towards reducing medication errors. *The Bulletin-Allegheny County Medical Society*. Nov, 2007:508-512.
2. Kamal KM, Desselle SP, Rane P, Parekh R, Zacker C. Content analysis of FDA warning letters to manufacturers of pharmaceuticals and biologicals. *Drug Information Journal*. July, 2009:385-393

SCIENTIFIC PRESENTATIONS

1. Impact of Pharmacist-Led Intervention on Medication Costs and Utilization in hospice care: A Claims Data Analysis. National Hospice and Palliative Care Organization (NHPCO's) 10th Clinical Team Conference, Facility-Based Hospice Forum, Scientific Symposium and Pediatric Intensive: Soaring to New Heights in Interdisciplinary Care to be held in Denver, CO from September 22– 26, 2009.
2. Kamal KM, Rane P, Parekh R, Desselle SP, Zacker C. Content Analysis of FDA warning letters and notices to manufacturers of pharmaceuticals concerning health outcomes- related promotional claims violations. Annual meeting of the International Society for Pharmacoeconomics and Outcomes Research (ISPOR), Toronto, Canada, May 2008.

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5. Parekh H, Parekh R, Rane P, Desselle S. A content analysis of advertisements for pharmacist positions: Employers' use of intrinsic and extrinsic motivational appeals. Annual meeting of the American Pharmacists Association (APhA), Atlanta, GA, March 2007.

RESEARCH GRANTS

Funding Source: Novartis.

1. Title: Consequences of pharmacy benefits design: An examination of clinical, economic, ethical, and humanistic considerations.
Role/Date: Research Assistant, December 1, 2006 to June 1, 2007.
Responsibilities included literature search, preparation of report, publication of results.
2. Title: Content analysis of FDA warning letters to Manufacturers of Pharmaceuticals and Biologics.
Role/Date: Researcher, December 1, 2006 to June 1, 2007.
Responsibilities included literature search, preparation of coding sheet, judging the warning letters, entering data into SPSS and conduct statistics, preparation of report, publication of results.

COMPUTER SKILLS

Statistical packages:	SPSS, SAS-JMP, SAS
Decision analysis software:	DATA TreeAge, Microsoft Excel, Microsoft Access
Other:	MS Office, Microsoft FrontPage

PROFESSIONAL MEMBERSHIP

2007 – Present	Member of American Society of Health Economists (ASHE)
2007 – Present	Member of International Society for Pharmacoeconomics & Outcomes Research (ISPOR)
2007 – Present	Member of the American Pharmacists Association (APhA)